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THE ROLE OF INVESTMENT BANKS IN CHINESE DOMESTIC IPOS

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Economische Wetenschappen

Door

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To my parents

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GENERAL INTRODUCTION

This dissertation consists of three empirical studies on the role of investment banks in Chinese domestic IPOs. My research period covers the IPOs from 1995 to 2011. The Shanghai and Shenzhen stock exchanges were re-established in 1990 and 1991, respectively. By the end of 2011, 2,342 firms became listed in these two markets, with a total market capitalization of RMB 21.48 trillion (USD 3.4 trillion), ranking as the second largest stock market and the largest IPO market globally. Nowhere else in the world has seen such explosive development in stock market in a mere 20 years. As an important intermediary in IPOs, investment banks offer their service by bridging investors and issuers. Our research offers a sketch on the behaviour of investment banks in Chinese domestic IPOs during this explosive development period, and thus is able to infer policy implications and draw lessons from it.

The first chapter examines how Chinese investment banks have grown their market share over the period 1995–2010, thereby providing insights into the functions (not) performed by those investment banks in Chinese financial markets. Chinese investment banks have built up their market share from scratch over the past two decades. During this process, the regulator at first has put investment banks under heavy administration and has intervened directly in the IPO market to guide banks to gradually take up a role in certifying the quality of issuers. Our empirical results indicate that prior to 2005 only political connections significantly positively affected the market share of lead underwriters in IPOs. After 2005, this favourable effect declined, but remains significant at about five percentage points. Meanwhile, investment banks applying a low evaluation standard on IPO candidates and/or investment banks charging low underwriting fees were able to expand their market share. In my view, the most interesting findings of this chapter is that, unlike in Western IPO markets, setting a high evaluation standard on IPO candidates has never helped Chinese investment banks to grow their market share. We argue that the unique Chinese IPO pricing mechanism – the issue price was capped by a fixed P/E ratio set by the regulator – has lead to such outcome. At one hand, with a fixed P/E ratio cap, the only way for issuers to ensure a higher offer

price was to boost their historical and/or forecasted earnings and thus incentivized issuers to seek underwriters with low evaluation standard. On the other hand, the fixed P/E ratio mechanism cut the link between the reputation of underwriter and issue price, and thus offers no incentive for issuers to seek underwriters with high evaluation standard. This finding offers a typical example on how regulations offer wrong incentives to market agents.

The up-mentioned P/E cap mechanism was abolished on June 10, 2009. Our second chapter explored an interesting phenomenon in the two years since the abolishment: the capital raised in Chinese domestic IPOs hugely exceeds the capital requirements disclosed by issuers in IPO application documents, i.e. *over-issuance*. In 587 IPOs during 2010–2011, the average issuer raised 2.55 times the amount needed. We checked the post-IPO usage of over-issued capital and find that it is spent neither on extra investments nor on debt retirement, but kept in the cash and cash equivalents account. We find it a puzzle why firms issue unnecessary capital in IPOs at the presence of high issuing costs that is proportional to total proceeds. We propose an explanation of investor exploitation based on behavioural finance theories which contend that issuers, together with their investment banks, may price IPO shares above intrinsic value at a time that stock market investors are overly optimistic. As those windows of opportunity are transitory in nature, issuers could try to fully exploit them by raising more finance than needed for their investment projects. We examine several predictions arising from this behavioural finance explanation. Also, we contrast those conjectures with inferences made from rational-agents and semi-strong efficient-markets theory. Our empirical results support the former, while they reject the latter. First, if the investor-exploitation explanation is true, we should be able to form investment portfolios based on over-issuance to realize an abnormal return under the investor-exploitation explanation for over-issuance. Conversely, under the rational-agents and efficient-markets theory, realizing an abnormal return based on publicly available information should then simply be impossible. Using over-issuance to proxy for the market sentiment as regards the IPO firm, we construct portfolios with a short (half a year) and a long (over one year) investment horizon after the IPO. The results point at

a significant alpha after estimating Fama-French three-factor regression models. Second, under the investor-exploitation explanation, over-issuance, the investment-bank fee rate, and the first-day abnormal return likely become endogenous. In contrast, under the rational-agents and efficient-markets theory, over-issuance is not expected; it should therefore have no explanatory power for fee rates and first-day abnormal returns, *ceteris paribus*. Our empirical results show that over-issuance correlates positively with the fee rate, while it correlates negatively with the first-day abnormal return. We thus conclude that in the two years after the abolishment of issuing P/E cap, investment banks, together with issuers, exploited overoptimistic investors by over-issuance. This chapter shows investment banks may not always properly behave to maximize total welfare.

The third chapter explores the link between IPO underwriting and post-IPO earnings forecasts by affiliated analysts (i.e. the analysts that are hired by the lead underwriter in IPOs). We proposed three possible links. First, investment banks with a more optimistic view about the issuing firm tend to obtain IPO mandates and thus, affiliated analysts naturally offer more optimistic forecasts than non-affiliated analysts (analyst-optimism view). Second, by underwriting, investment banks obtain better insides into the issuing firm's business and establish better relationship with issuing firm's management; thus, affiliated analysts obtain more timely private information and offer more accurate/less biased forecasts (information-advantage view). Third, to avoid a rapid reduction in stock price in a short period after IPO, affiliated analysts may issue overoptimistic forecasts to support stock price in the aftermarket (post-IPO price-supporting view). The abolishment of issue price P/E cap again offers us a good natural experiment opportunity. The precondition for investment banks to offer post-IPO price support is that issue price is largely set by investment banks. Before the regulatory change, investment banks had little influence on issue price and thus had no incentive to offer post-IPO price support, while after regulatory change, investment banks set issue price and need to support aftermarket price. So, if post-IPO price-supporting view is true, we should observe affiliated analyst to offer more optimistic forecasts *only* after regulatory change. On the other hand, under analyst-optimism view and information

advantage view, the difference between the forecasts made by affiliated analysts and by non-affiliated analysts should keep similar across the regulatory change. Our empirical findings overwhelmingly confirm the post-IPO price-supporting view. Specifically, we find that over the full sample period (2004–2012), both affiliated and non-affiliated financial analysts issue severely positively distorted forecasts. However, we detect no significant difference in the forecast bias between affiliated and non-affiliated analysts before the regulatory change. Conversely, after the regulatory change, the forecast error of analysts affiliated with the IPO lead manager is on average 33 percentage points bigger than that of non-affiliated analysts. Moreover, in the 90 days after listing, this relative bias even increases to 63 percentage points and enlarges further when the issuer's stock price dropped in the aftermarket. We thus conclude that investment banks may use the earnings forecast of their financial analysts to offer post-IPO price support to the firms they underwrote.

Overall, I did not find a very positive role of investment banks in Chinese domestic IPOs. However, those misbehaviours are not unique in China. Many literatures find similar behaviours by investment banks in the developed markets. By using Chinese data, we are able to explore such behaviours more clearly. Our three chapters show that in financial market, both regulation and free market are important mechanisms to offer agents the correct incentives to maximize social welfare; totally relying on or neglecting either mechanism leads to unintended (bad) outcomes. The difficulty lies in how to implement these two mechanisms at a proper time, on proper targets, with a proper combination.

CHAPTER 1

What determines the market share of investment banks in Chinese domestic IPOs?

1.1 Introduction

Since 1978, China has undergone unprecedented reforms to re-model its centrally planned economy into a more market-oriented one. A focal point in those reforms has been to establish well-functioning financial markets, as market prices can contribute to a more efficient allocation of financial resources. Through an initial public offering (IPO), a firm lists itself for the first time on a stock exchange. Also, it raises extra capital to finance prospective investment projects. Firms that are able to list and sell their shares at an attractive price likely find it easier to finance their growth opportunities. Well-functioning stock markets are therefore essential for the development of those listing companies as well as the economy as a whole (e.g., King and Levine, 1993; Levine and Zervos, 1998). According to the figures compiled by the National Bureau of Statistics, 2,104 firms became listed in Shanghai or Shenzhen by the end of 2010, with total market capitalization reaching RMB 26.5 trillion. Correspondingly, China's domestic stock markets now rank as the world's second largest.

Along the re-foundation of the stock exchanges in Mainland China at the beginning of the 1990s, the government has also allowed a whole new indigenous industry of investment banking to develop.[1] Yet, academic research on the role and the growth of investment banks in Chinese domestic IPOs is non-existent to date. Nonetheless, investment banks, as repetitive agents in the IPO market, play a crucial role in the process of certifying, promoting, placing, and supporting an

[1] Chinese investment banks were all established by local owners. Foreign investment banks have had little, if any, influence on the development of the industry. At present, investment banks still have to be majority-owned by a domestic owner in order to be able to underwrite IPOs in Mainland China. Morgan Stanley founded the first jointly owned investment bank in 1996. Other foreign investment banks (Deutsche Bank, Goldman Sachs, LCL, SMBC, and UBS) were allowed to set up joint ventures only as of 2004. Yet, those joint ventures have advised only 60 A-share IPOs (2.9%) up till the end of 2010.

offering (Chitru *et al.*, 2005; Brau and Fawcett, 2006). Indeed, as the IPO is a one-time event, issuing firms face lots of questions, like the choice on the appropriate exchange to list and on how to satisfy the listing requirements, the decision on the offer price for their stock, the choice on potential investors and on how to convince them to buy and hold the IPO shares, etc. For an IPO firm, becoming listed only once, it is too costly to acquire the required expertise to solve all those questions by itself. Moreover, a huge asymmetry in information exists between issuers and investors at the time of the IPO. So, investors could be concerned about buying a 'lemon' when shares are sold directly by the issuer (Akerlof, 1970). Besides, there is also a conflict of interests between issuers and investors, as issuers want to sell their shares at a high offer price, while investors have an interest in buying at a low price. Brealey *et al.* (1977) were the first to argue that an intermediary can mitigate those information and incentive problems in the IPO market. Due to the repetitive nature of its operations, this agent has to maximize its utility not just on one IPO, but on a series of future IPOs. In other words, it should not behave opportunistically in any single IPO to avoid jeopardizing its chances to attract future IPO business. It therefore has to develop and maintain a good reputation among issuers and investors, which is crucial for its growth and survival (see also Beatty and Ritter, 1986; Chemmanur and Fulghieri, 1994). By providing high-quality services at a reasonable price, investment banks also contribute to well-functioning financial markets.

Our paper tries to fill the current void in the literature by examining how Chinese investment banks have grown their market share over the period 1995–2010, thereby providing insights into the functions (not) performed by those investment banks in Chinese financial markets. For this purpose, we examine how the government's visible hand vis-à-vis the market's invisible hand have affected investment banks' market share in Chinese domestic IPOs. We thereby account for the major institutional changes that took place over our sample period. Several features about the Chinese IPO market make this research interesting. First, Chinese investment banks have built up their market share from scratch over the past two decades. During this process, the regulator at first

has put investment banks under heavy administration and has intervened directly in the IPO market to guide banks to gradually take up a role in certifying the quality of issuers. Yet, those heavy regulatory procedures may also have opened the door for an unequal treatment across investment banks, thereby favouring the ones with better political connections. While prior research has documented the impact of political connections on firms' financing decisions and firm value (e.g., Faccio, 2006; Li *et al.*, 2008; Du and Girma, 2010), we analyse their effects on investment-bank market shares. Besides, this institutional aspect makes the Chinese IPO market different from any Western IPO market, where the market mechanism itself plays a major role in rewarding and punishing investment banks based on their behaviour in the IPO market. For IPOs in the U.S.A., Dunbar (2000) indeed finds that investment banks performing poorly in terms of IPO certification, pricing, and research coverage lose market share over time.[2] Nonetheless, along with the growth of the Chinese IPO market, the regulator has gradually reduced its direct market intervention and has allowed market forces to become more influential. Those institutional changes now enable us to explore whether and how the nature and price of underwriting services provided by investment banks have become influential in determining their market share in the IPO market.

Our empirical results indicate that prior to 2005 only political connections significantly positively affected the market share of lead underwriters in IPOs. On average, an investment bank controlled by the central government had a market share that was about seven percentage points larger than that of a bank controlled by a local-level government or by a private owner. As the average market share in that period was only 3.7%, strong political connections thus created a huge advantage for investment banks. After 2005, this favourable effect declined, but remains significant

[2] Dunbar (2000) is the only study to date that has examined how the quality and the price of underwriting services affect investment-bank market shares in IPOs. His sample consists of U.S. IPOs on the New York Stock Exchange, American Stock Exchange, and Nasdaq between 1984 and 1995. He finds that underpricing too much, being associated with IPOs with poor long-run performance and with withdrawn offers, experiencing a decline in analyst reputation, and charging too high underwriting fees all reduce the subsequent market share of investment banks. He further detects that non-established investment banks choose to focus on a specific industry, while the more established banks diversify their industry focus.

at about five percentage points. Meanwhile, investment banks applying a low evaluation standard on IPO candidates and/or investment banks charging low underwriting fees were able to expand their market share. The above findings are in line with the policy changes that took place in the Chinese IPO market. Up till Dec. 31, 2004, the regulator restricted competition among investment banks by imposing a maximum number of IPO applications that could be handled at once. Also, before March 1, 2004, underwriting fees were restrained to be between 1.5% and 3% of gross IPO proceeds. Those early policies thus limited the ability of investment banks to set up their own marketing strategy for IPOs. With the abolition of restrictions, investment banks could start to compete more freely against each other, thereby selecting a business model that best reflects their specific characteristics and the regulatory conditions in the IPO market.

One of the most interesting findings of our study is that, unlike Western IPO markets, setting a high evaluation standard on IPO candidates has never helped Chinese investment banks to grow their market share. Before 2005, IPO evaluation standards simply displayed no relation with market shares. Surprisingly, after 2005, investment banks adopting a high standard actually lost market share. We argue that the unique Chinese IPO pricing mechanism – the issue price was capped by a fixed P/E ratio set by the regulator – has incentivized IPO firms to hire an investment bank that applies a low evaluation standard. With a fixed P/E ratio cap, the only way for issuers to ensure a higher offer price was to boost their historical and/or forecasted earnings. So, by involving a lead underwriter with a low IPO evaluation standard, the odds that the bank would either not detect or turn a blind eye on earnings exaggeration were considerably larger. Our findings on the role of the IPO evaluation standard are somewhat related to those of DeFond *et al.* (1999), who examine the audit market for Chinese IPO firms. They show that with the introduction of stricter audit standards in 1995, the top-10 audit firms that subsequently applied those standards lost market share. However, DeFond *et al.* do not explain in detail why issuers may lack incentives to demand certification from independent auditors. In this article, we dig deeper into the institutional reasons driving this phenomenon in the IPO market.

The remainder of the paper is organized as follows. In Section 1.2, we briefly review the regulation of the Chinese IPO market; we focus on those policies that may have affected the market shares of investment banks during 1995–2010. We develop our hypotheses in Section 1.3 and describe the data and variable measurements in Section 1.4. In Section 1.5, we present and discuss our multivariate regression results and the results of some robustness checks. Section 1.6 concludes the paper.

1.2. Historical review

1.2.1. The Chinese domestic IPO mechanism

The stock exchanges of Shanghai and Shenzhen were re-established in 1990 and 1991, respectively to facilitate securities transactions. In Oct. 1992, the central government founded the China Securities Regulatory Commission (CSRC) to regulate Chinese securities markets. Since then, the IPO rules have been designed, changed, and enforced by the CSRC, which falls under the direct supervision of the central government. From 1993 till June 30, 1999, stock offerings in China were subject to a quota system. Under this system, the State Planning Commission, in cooperation with the People's Bank of China and the CSRC, every year decided on the number of new shares to be issued. These quotas were subsequently allocated to provinces and to national ministries and committees which recommended the companies under their jurisdiction for listing. The local securities authorities, i.e. the CSRC's local branches, invited the enterprises in their region to apply for a stock market quotation and made a first selection among IPO candidates. After their selection, firms had to engage an investment bank, which would prepare and submit their IPO application to the central CSRC. Such an application had to include a detailed description of the IPO candidate's operations, financial performance, and internal control procedures and a first draft of the IPO prospectus. Based on those application materials, the central CSRC made a final decision on whether the IPO candidate could become listed. In this way, the CSRC itself was heavily involved in examining the quality of IPO firms. Meanwhile, the CSRC required investment banks to verify

the validity and accuracy of all information in the IPO application, as a way to prepare them to take up a role in issuer-quality certification. As of July 1, 1999, with the introduction of the China Securities Law, this quota system was formally abolished. Also, firms eligible for listing were no longer picked by the CSRC's local branches. Every company satisfying the criteria specified in the Securities Law could henceforth apply for a stock market quotation; and firms satisfying those criteria could not be refused. The listing criteria remained as demanding as under the quota system. Specifically, the applicant had to show positive earnings (net income) in each of the three years before its IPO. Also, it had to establish adequate internal control procedures and operate independently from other firms controlled by the same ultimate owner. As of July 1, 1999, the CSRC fully relied on investment banks to check whether those conditions were fulfilled.

The formula to calculate the IPO offer price was changed several times in history. Nonetheless, the issue price has always been capped at the product of a fixed P/E ratio and a weighted average of pre-IPO earnings and forecasted earnings for the IPO year. Every year, this fixed P/E ratio cap was set by the CSRC and applied to all IPOs in that year. To attract the interest of the general public for IPOs, the CSRC deliberately set the P/E ratio cap considerably below the prevailing market P/E ratio. P/E ratio caps were within the range of 13 to 16 during 1994–1999, much below the secondary-market P/E ratio of 15 to 58 (Francis *et al.*, 2009). During 2000–2004, the P/E ratio cap was about 20, while the market P/E ratio was between 24 and 58 (Tian, 2011). After Dec. 31, 2004, with the publication of Circulation No. 162, this official P/E ratio cap was given up. However, the CSRC continued to manage IPO offer prices to some extent, relying on an implicit P/E ratio cap of 30 for most IPOs (Gao, 2010). On June 10, 2009, with the publication of 'The guiding advice on further reform of the IPO pricing method', the CSRC announced that it would no longer interfere in the pricing of IPO shares.

The above IPO pricing mechanism has provoked extremely high first-day abnormal returns. According to the numbers compiled on Jay Ritter's website, the first-day abnormal return in Chinese domestic IPOs is the third largest in the world, averaging to 133% in 1990–2010. Yet,

studies report different numbers in different time periods. Su and Fleisher (1999) obtain 949% in 1987–1995, while Chi and Padgett (2005) find 129% in 1996–2000; Guo and Brooks (2008) report 93.49% between 2001 and 2005. These high first-day abnormal returns have created a 'new-issue fetish', as it was called by the Chinese media. Investors almost blindly bought any new shares, paying only little attention to the quality of the IPO firm, as the CSRC virtually guaranteed them to make money.[3] Not surprisingly, Chinese IPOs have been severely oversubscribed. The GTA IPO research database reveals an average (median) oversubscription rate equal to 2,250 (219) between 1995 and 2010, much higher than in any Western IPO market. For comparison, using a unique database containing 39 IPOs in the U.S.A. and in Europe, Cornelli and Goldreich (2001) find that the oversubscription rate averages 5.2 (median of 3.0).

The rules for allocating oversubscribed IPOs to investors – including retail as well as institutional – have changed several times in history as well. Before Jan. 1, 1999, lottery cards were sold to investors and IPO shares were allocated randomly, based upon the serial number of those cards. After 1999, buyers have to make full prepayment and initial shares are rationed according to the amount of prepayment. In other words, after the IPO offer price has been set and publicly announced, both retail and institutional investors first subscribe to buy a certain number of IPO shares at this offer price and make the corresponding down payment. Subscription is not limited to the branches of the IPO underwriter, as it can be made to the branches of *any* investment bank, which then deposits the down payments into a special account at the stock exchange on which the issuer plans to list. If total subscription exceeds the total number of shares offered, IPO shares are allocated proportionally among subscribers based upon their subscription and down payments. So, unlike Western IPO markets, investment banks in China never have had any discretionary allocation

[3] Investors in Chinese domestic stock markets are typically small and unsophisticated. A study published on the website of the China Securities Depository and Clearing Corporation (CSDCC) shows that small retail investors accounted for about 80% of the transaction volume in the year 2007. About 56 million Chinese citizens traded stocks; 70% of them had monthly income below RMB 5,000; over 50% of them held stocks for less than three months. Many investors thus invest in stocks for speculative purposes rather than for long-term investment purposes.

rights. This specific allocation mechanism hence has also prevented investment banks from competing for IPO mandates by means of their sales channels.

1.2.2. Investment banks in Chinese domestic IPOs

The first investment bank, Shenzhen Special Economic Zone Securities Firm, was founded only in 1987. During 1987–1992, three types of financial institutions could underwrite IPOs: securities firms, trust and investment corporations, and commercial banks. However, public offerings were not required to involve an investment bank. Yet, of the 180 firms that made an IPO between 1987 and 1992, about 80% engaged one. Those investment banks were ultimately owned by either the central government or a local-level government. So, they all started with state ownership.[4]

On June 24, 1993, the CSRC issued 'The circulation on enhancing the role of securities underwriters and professional intermediaries in stock offerings', which henceforth mandated every issuer to select an investment bank as lead underwriter for its IPO. Upon receiving a qualification from the CSRC, investment banks had to organize the whole IPO process and were responsible for the validity and accuracy of IPO application materials. Regulation also stipulated that the lead underwriter would be punished by the CSRC if the IPO documents contained serious misleading information or were fraudulent. This punishment included fines, a suspension of the investment bank's qualification, and even disqualification. Besides, the lead underwriter had to buy any unsold IPO shares at the offer price if the IPO could not attract enough investor interest; this never happened in the history of Chinese domestic IPOs, however. Also in 1993, the CSRC instructed that commercial banking and investment banking should be separated. This regulation was further strengthened by the Law of Commercial Banking, passed by the Standing Committee of the National People's Congress on May 10, 1995, imposing that financial groups with a commercial

[4] To protect a domestic industry, the CSRC never allowed financial institutions majority-owned by foreigners to underwrite IPOs in Mainland China. Besides, privately owned investment banks are still scarce today. By the end of 2010, only five investment banks are controlled by private owners; they have underwritten 57 IPOs, i.e. 2.7% of the total number of IPOs.

banking license could no longer carry out any investment banking business. Hence, for the investment banks in our sample, the IPO mandate is likely to be the very first relationship between with listing firms. A few years later, in 1999, trust and investment corporations were asked to split their investment banking business into independent legal entities, engendering a new wave of industry reorganizations in 1999–2001.

On June 17, 1996, to further regulate the behaviour of lead underwriters in Chinese domestic IPOs, the CSRC issued 'The circulation on issuing measures for the management of stock underwriting by securities firms'. Under this regulation, the CSRC henceforth would review the performance of investment banks at the end of every year and determine whether they could continue their underwriting business in the subsequent year. Investment banks that had committed serious errors or fraud could thus lose their qualification. This same regulation also required underwriting expenses, including the sponsor fee, to be between 1.5% and 3% of gross IPO proceeds. The latter policy was maintained until the CSRC implemented 'The interim measures for stock issuance and listing recommendation'. As of March 1, 2004, investment banks became free to set their fees in IPOs.

On Dec. 31, 2003, the CSRC released the trial implementation of the price inquiry system for IPOs. Investment banks no longer needed to obtain a yearly underwriting qualification but could set up their business upon registration with the CSRC and upon meeting certain criteria. The investment banks eligible for registration had to be comprehensive securities firms with a registered capital of at least RMB 500 million and employing at least two sponsors.[5] The CSRC required those investment banks to be "…bound by principles of good faith and due care and skill; they should make a full investigation into the issuer to fully understand its financial and operating position as well as its risks and problems" and "conduct a prudent verification of the information obtained in the due diligence".

[5] Sponsors are individuals certified by the CSRC. A firm should be recommended for listing by one qualified investment bank and by two sponsors. In China, sponsors are usually investment-bank employees.

With the abolition of the quota system on June 30, 1999, the CSRC became less involved in checking the quality of IPO firms (see Section 1.2.1). To ensure that investment banks would presume their certification role, the CSRC resorted to direct market intervention. From 2001 till the end of 2004, the CSRC granted a number of 'channels' to every investment bank, thereby directly influencing its market share. Those channels indeed limited the number of IPOs an investment bank could apply for at once. For example, if an investment bank obtained four channels, it could handle at most four IPOs at the same time. So, the number of IPOs an investment bank could underwrite in one year depended on two factors: its number of channels and the speed at which the CSRC handled its ongoing IPO applications. On average, an application took about half a year to be handled. If the CSRC had doubts on the validity and accuracy of the application documents, it could extend the approval period by asking for more information. The number of channels a bank could obtain varied from one to eight, depending upon the CSRC's assessment of the investment bank's capacity. On Dec. 31, 2004, this channel mechanism for IPOs was formally abolished.

1.3. Hypotheses

Direct empirical tests on the various determinants of investment-bank market shares are scarce in the literature to date. Dunbar (2000) is the only study that has analysed how the quality and price of underwriting services provided by investment banks affects their market share in U.S. IPOs. Somewhat related, Rau (2000) examines how acquiring-firm performance and contingent fees impact the market share of investment banks acting as advisor in U.S. M&As. In this article, we wish to examine how the government's visible hand vis-à-vis the market's invisible hand have affected investment banks' market share in Chinese domestic IPOs. So, we develop five hypotheses to explore how the investment bank's political connections and it reputation in certifying, promoting, and supporting IPOs at a reasonable price influence its market share. By doing so, we examine the conditions under which investment banks competed for market share by their services (certification, pricing, and research coverage) and price (fee rates) and when they did not. As many

institutional changes took place over our sample period, we account for a potential structural break at the end of 2004, which is when the IPO channel mechanism was formally abolished. In the empirical analyses, we subsequently test the robustness of our results when using other potential structural break dates.

1.3.1. The political connections of investment banks

Faccio (2006) points out that political connections could be valuable to firms in various ways, including a preferential treatment in government contracts, a preferential treatment by other state-owned enterprises, a relaxed regulatory oversight of the firm itself, or a stiffer regulatory oversight of its rivals. For China, which is still characterized by weak legal and market institutions, many scholars have shown that political connections matter for firm value and financing decisions. For example, Li *et al.* (2008) demonstrate that Communist Party membership helps private entrepreneurs to obtain loans from state-owned banks and to enjoy better legal protection. They also detect that Party membership is particularly valuable in regions with a lower institutional development. Du and Girma (2010), using data on 106,000 Chinese firms, conclude that political connections, measured by a government ownership stake, significantly enhance a firm's survival chances. Interestingly, they observe that the benefits from political connections follow a political hierarchy. Firms with a stake held by the central government are better off than firms with any other (lower) level of government ownership.

In China, investment banks had to develop their market share in IPO underwriting from scratch, at a time when the quality of institutions was very poor. Moreover, the IPO process was subject to heavy government administration and direct market intervention, especially before 2005. In such a context, investment banks could have relied on their political connections to initiate and enforce contracts (see also Li *et al.*, 2008). This may also have opened the door for an unequal treatment across investment banks. As an example, investment banks with better political connections may have been able to obtain more channels under the channel system and/or to reduce

the application period for their IPOs. Besides, political connections may have helped investment banks to evade punishment after serious errors or fraud in prior IPOs. Those networks could have helped investment banks to attract more IPO underwriting business. However, on Dec. 31, 2004, the CSRC considerably reduced its direct intervention in the IPO market. In this study, we therefore posit that political connections were extremely valuable for investment banks to build their market share in the early years after stock market re-establishment, while their importance may have declined over time, along with the institutional reforms. In summary, we postulate the following hypothesis:

Hypothesis 1: Political connections positively influenced the market share of investment banks in Chinese domestic IPOs; the strength of this relation may have declined after 2005.

1.3.2. The certification role of investment banks

Booth and Smith (1986) argue that investment banks, as repeated participants in the IPO market, offer certification for issuing firms. By putting their reputation at stake, they can assure the quality of IPO firms to investors. Chemmanur and Fulghieri (1994) develop a dynamic model to show that the evaluation standard adopted by an investment bank affects its reputation among investors. This reputation in turn influences its market share. The essence of this theoretical model is that investors update their beliefs on the skills of an investment bank by examining the quality of the IPO firms it recently advised, given that the true quality of issuers eventually becomes known in the aftermarket. If the bank applies a high evaluation standard, it is better able to find out the true quality of IPO candidates and correspondingly decides to stay away from low-quality issuers. In this model, IPO candidates subsequently choose an investment bank with a high evaluation standard to underwrite their IPO, as this helps them to market the IPO shares as well as to increase the IPO offer price. So, an investment bank that assists high-quality IPO firms should gain market share over time.

However, an investment bank's reputation of strictly evaluating IPO candidates could not help issuers in China to increase their offer price and, thus, was not demanded by IPO firms. The reason is that the CSCR largely set the issue price by imposing a fixed P/E ratio cap to all IPOs in one year, thereby allowing investors to realize large IPO returns, regardless of issuer quality. In fact, we claim that issuers had strong incentives to hire a lead underwriter with a low evaluation standard, as firm earnings could then be exaggerated more easily; this, in turn, could help to raise the IPO offer price.[6] So, we conjecture that in China especially investment banks adopting a low evaluation standard were able to gain market share over time. This prediction seems to oppose the theoretical model of Chemmanur and Fulghieri (1994), but arises exactly after implementing its rationale to the Chinese context. IPO candidates will choose a bank with either a high or a low evaluation standard, depending upon which standard helps them to increase the issue price. In China, a low evaluation standard achieved this objective during our period of analysis. As investors had only limited opportunities to sue misbehaving issuers and underwriters, government administration and direct market intervention were the only forces that could impede investment banks from competing with a low evaluation standard. While the CSRC relied on a strict supervision to hold lead underwriters responsible for the quality of IPO firms before 2005, it reduced its role after 2005. Some investment banks may thus have modified their evaluation standard over time, to attract more underwriting business. The above arguments result in the following hypothesis:

Hypothesis 2: An investment bank's evaluation standard on IPO candidates did not significantly influence its market share in Chinese domestic IPOs prior to 2005; after 2005, investment banks with a low evaluation standard were able to gain market share.

1.3.3. The pricing role of investment banks

The IPO literature has pointed out that IPOs are generally *underpriced* at the firm's stock market

[6] Aharony *et al.* (2000), Ding *et al.* (2007) and Kao *et al.* (2009) find evidence of earnings management in Chinese IPOs.

introduction, i.e. issuers sell shares at a price below the firm's fundamental value, thereby leaving some money on the table for investors. Different theories have been put forward to explain this phenomenon and its underlying drivers (for a good review, see Ritter and Welch (2002)). For example, Rock (1986) claims that uninformed investors demand IPOs to be underpriced to compensate them for their possible loss arising from a 'winner's curse'. As the IPOs of issuers surrounded by more information asymmetries are riskier, those firms should sell their shares at a larger discount, ceteris paribus. Benveniste and Spindt (1989) contend that issuers leave money on the table to reward informed investors for revealing their private information. Tinic (1988) considers underpricing as a protection against possible future litigation from investors. Investment banks, as repeated participants in the IPO market, play a crucial role in setting offer prices and hence can ensure that an IPO is appropriately *underpriced*. Beatty and Ritter (1986) and Chemmanur and Fulghieri (1994), among others, therefore conjecture that the investment banks that set a wrong price, by offering too much or too little underpricing compared to the expected level, will subsequently lose market share. The reason is that underpricing too much reduces the attractiveness of an investment bank from the issuers' point of view, while underpricing too little annoys investors. The effect of abnormal underpricing on market share therefore depends on the relative importance of these two forces.

For China, we expect to find no evidence of such a relation. Indeed, in order for a relation to arise between abnormal underpricing and investment-bank market shares in IPOs, it is necessary that IPO underwriters have full discretion in setting the offer price, so that they can be blamed for a wrong pricing (and wrong underpricing). Up till June 10, 2009, the CSRC has been making final decisions on the offer price in IPOs. So, in the history of Chinese domestic IPOs, the pricing role of investment banks has been largely overtaken by the regulator. Any incorrect pricing could then not be attributed to the incompetence of investment banks. Moreover, even if investment banks could influence the offer price to some extent (by lowering their evaluation standard), this does not need to imply that they were able to correctly underprice an IPO. Given the P/E ratio cap that existed, it

indeed created an incentive for IPO candidates to inflate their earnings (as we argue in Hypothesis 2), but this did not provide investment banks with the necessary tools to accommodate realized underpricing and expected underpricing. In line with this argument, many researchers studying IPOs in China have failed to find a significant relation between issuer-specific characteristics and IPO underpricing (e.g., Guo and Brooks, 2008; Gao 2010; Tian 2011). On the contrary, Tian (2011) argues that the first-day abnormal return in Chinese IPOs largely results from excessive demand created by the gap between the issuing P/E ratio cap and the prevailing market P/E ratio. So, although underwriters could influence offer prices to some extent, they never obtained the power to fix a 'good' underpricing level. In fact, because the issuing P/E ratio was always substantially below the market P/E ratio, this goal was never achievable. We therefore conclude that leaving too much or too little money on the table should not affect investment banks' market share in Chinese domestic IPOs. So, we put forward the following hypothesis:

Hypothesis 3: Abnormal underpricing did not significantly influence the market share of investment banks in Chinese domestic IPOs.

1.3.4. Research coverage provided by investment banks

Arbel (1985) and Merton (1987) develop an asset pricing model for financial markets characterized by incomplete information. Both scholars show that, because of incomplete information, investors may ignore particular assets, which reduces the investor base for those assets and, hence, their equilibrium price in financial markets. Merton (1987) further suggests that firm managers might be willing to spend some resources in order to increase their firm's visibility and hence its investor base. Loughran and Ritter (2004) point out that analyst coverage, especially by star analysts, is essential to increase the visibility of listing firms among investors. They further find that as of the 1990s, issuers in the U.S.A. have put more weight on hiring lead underwriters with highly ranked financial analysts to ensure research coverage after the firm's first listing. Likewise, Krigman *et al.* (2001) show that one of the main reasons why issuers in the U.S.A. change their underwriters in

seasoned equity offerings is better analyst coverage. In sum, issuers seem to highly value star-analyst coverage by their investment banks.

In China, the Certified Security Analyst Committee was not established until 2001. Also, the first report with the names of outperforming financial analysts was made public only at the end of 2003. Nonetheless, it is interesting to check the influence of star analysts on investment-bank market shares in the second subperiod. Indeed, stock markets in Mainland China remain largely dominated by small retail investors, who might be highly responsive to analyst reports and investment recommendations. Having star-analyst coverage could then be highly beneficial to the stock market value of listed firms, thereby inducing IPO candidates to select an underwriter that employs those star analysts. We expect this relation to arise only in the second subperiod, after star analysts were able to establish their reputation among issuers and investors.

Hypothesis 4: Employing star analysts positively influenced the market share of investment banks in Chinese domestic IPOs after 2005.

1.3.5. Fees charged by investment banks

Investment banks charge fees to issuers for the services that they provide in the IPO process, such as performing the due diligence, drafting the IPO prospectus, pricing the offer, distributing the shares, providing price support in the aftermarket, etc. Holding constant the actual and perceived underwriting services provided, the price charged for those services likely is another important aspect of competition among investment banks. Underwriting fees could therefore be another major determinant of investment-bank market shares (Dunbar, 2000; Rau, 2000). In order to expand their market share, investment banks may initially set low fees. Once their market share has been established, they could then adjust their fees to a more normal rate or even an abnormally high rate when enjoying market power. Moreover, investment banks anticipating corporate bond issues, seasoned equity offerings, merger and acquisition activity after an issuer's first listing may have an incentive to further limit underwriting fees in the IPO, as underwriting a firm's IPO may enhance

the odds of advising on that firm's subsequent corporate finance transactions (e.g., Jegadeesh *et al.*, 1993; Krigman *et al.*, 2001; Ljungqvist *et al.*, 2006). How effective an investment bank's fee-rate policy is for growing its market share is an empirical question; it likely depends on the elasticity of demand (for IPO underwriting) as to the price (the fee rate). Besides, likewise abnormal underpricing, we expect that especially the deviation of actual fees from normal fees, given the characteristics of the IPO firm and its offering, should matter to explain investment-bank market shares.

In China, investment banks quote their fees as a percentage of gross proceeds when competing for IPO underwriting business. However, before March 1, 2004, the CSRC restricted underwriting fees to be between 1.5% and 3% of gross IPO proceeds. This likely has limited an investment bank's ability to use fees to compete for IPO mandates. After March 1, 2004, investment banks became free to set their underwriting fees, making it much easier to rely on fee rates to build their market share in IPOs. As it takes about six months to list a firm, while IPO fee rates are typically set at the beginning of the IPO process, we expect that this change in regulation may not have affected many of the issuers becoming listed in the period between March 1, 2004 and Dec. 31, 2004. We therefore rely on the same structural break date as before, but then re-run the regressions using Feb. 28, 2004 as another breakpoint in the robustness checks later on. In sum, we postulate the following hypothesis:

Hypothesis 5: Abnormal fee rates bore no relation with the market share of investment banks in Chinese domestic IPOs before 2005; after 2005, investment banks setting a fee rate below the normal rate were able to gain market share.

1.4. Data and variable measurements

We collected the data on all Chinese domestic IPOs between 1990 and 2010. Our sample includes all A-share offerings on the stock exchanges of Shanghai and Shenzhen; A shares are traded in RMB and target domestic investors. Foreign investors have been allowed to invest in A shares since Dec. 1, 2002, but only through qualified foreign investment funds that, together, cannot hold

more than 10% of a firm's stock.[7] We collected the offer date, the offer price, gross IPO proceeds, the lead underwriter(s), underwriting fees, and total floating costs from the GTA IPO research database. As the data on some of the explanatory variables were still missing in the early years after stock market re-establishment, we had to restrict our sample period to 1995–2010. We also obtained pre-IPO accounting data from the GTA database. Post-IPO accounting data were collected from the CSMAR financial reports database. When pre-IPO accounting data were available in GTA as well as in CSMAR, we used the CSMAR records. Next, we cross-checked the offer information with the records published on *finance.sina.com.cn*. In case of discordance (1.49% of IPOs), we manually checked the IPO prospectus to correct the data. Stock price information was retrieved from Datastream.

In the following subsections, we explain the measurement of our dependent and explanatory variables. We also report and discuss descriptive statistics on these variables.

1.4.1. The market share of investment banks

The GTA IPO research database includes 174 different names of investment banks that underwrote at least one IPO during 1990–2010. However, that database did not develop a coding system to uniquely identify each bank, which gave rise to a number of ambiguities. Moreover, any newly developing industry is characterized by entry, exit, and restructuring of existing firms. So, we detected name changes, ownership changes, and mergers and acquisitions of investment banks from investigating their website and annual reports. We applied the following coding system for the 174 initial banks:

1. If one investment bank owns another by more than 50%, we used the same code for both banks. The reason is that to the CSRC, to the issuers, and to the investors, these two banks are actually

[7] B shares are offered to foreign investors and are traded in USD or in HKD. By the end of 2010, only 108 firms became listed in the B-share market, typically a few months before the firm's A-share offering. The market value of these B shares is typically less than 1% of the market capitalization of the firm's A shares.

one entity: they have the same ultimate owner and they even consolidate their annual accounts. We identified 5 such cases.

2. Name changes arising from ownership changes, with the new owner not being an investment bank. We assigned the same code to the investment bank before and after its name change, treating it as one entity, as the new non-bank owner inherits the business, the staff, and the reputation of the old investment bank. We identified 41 such cases.
3. Takeover by another investment bank. We used different codes for the acquired bank and the acquirer before the takeover. Yet, as of the takeover date, we assigned the acquirer's code to the combined bank. We identified 10 such cases. None of the acquired banks was involved in an IPO in the two years before its takeover.
4. Merger. If two existing investment banks combine to form a new bank (under a new name), we assigned separate codes to the banks before and after their merger. We identified 3 such cases. As we use lagged explanatory variables in the regressions, we computed these variables for the merged bank as weighted averages from the IPOs underwritten by the stand-alone banks.

Applying the above coding system resulted in a final sample of 126 investment banks that advised 2,064 IPOs as lead underwriter in the period 1990–2010. Like Megginson and Weiss (1991), we subsequently calculated the market share of each investment bank in every year by first summing the gross IPO proceeds underwritten by that bank in that year and then dividing this sum by the year's total gross IPO proceeds.[8] 17 IPOs had two lead underwriters, while six IPOs had three lead underwriters and two IPOs had four lead underwriters. For those IPOs, we determined each bank's stake by dividing the gross IPO proceeds by the number of lead underwriters. Table 1.1 reports a year-by-year summary of market shares. The Herfindahl index of market concentration was rather

[8] We examined the robustness of our results when calculating market shares based upon the number of IPOs rather than the amount of gross IPO proceeds underwritten by a bank, but found that our results are not robust, except for the effect of political connections. We relate this finding to the fact that many banks advised only one or two IPOs per annum (see also Table 1.1). Carter and Manaster (1990) suggest another measure based on tombstone announcements in U.S. news outlets. However, we could not compute this measure, as tombstone news announcements are not used in Chinese domestic IPOs.

high in 1990–1992, which can be considered as the infant period of Chinese domestic stock markets. From 1993 to 2000, the Herfindahl index dropped below 0.1 in most of the years. We note an increase in market concentration after 2001, resulting mostly from the M&As in 1999–2001. Finally, the huge increase in the number of IPOs in 2010, which can be linked to the launch of the Growth Enterprise Market for SMEs in Oct. 2009, engendered a sharp decline in the Herfindahl index.

Table 1.1: Summary statistics on the market share of investment banks in Chinese domestic IPOs.

This table summarizes the market share of investment banks in Chinese A-share IPOs. The market share of an investment bank in a given year is the sum of the gross IPO proceeds advised by that bank as lead underwriter divided by the total gross proceeds raised in all IPOs in that year. When multiple lead underwriters were involved, each bank's stake is calculated by dividing the gross IPO proceeds by the number of lead underwriters. The Herfindahl index of market concentration is the sum of the squared market shares of all investment banks in a given year.

Year	Number of IPOs	Gross IPO proceeds (million RMB)	Number of underwriters that advised at least one IPO	Average number of IPOs per underwriter	Median number of IPOs per underwriter	Average market share per underwriter	Median market share per underwriter	Herfindahl index of market con-centration
1990	7	594	7	1.00	1	14.3%	3.4%	0.5728
1991	17	872	13	1.31	1	7.7%	3.6%	0.1441
1992	110	35,900	36	3.06	2	2.8%	0.2%	0.2736
1993	142	23,600	43	3.35	2	2.3%	1.0%	0.0855
1994	38	5,230	22	1.73	1	4.5%	2.9%	0.0753
1995	13	2,190	10	1.30	1	10.0%	5.7%	0.3064
1996	170	22,300	36	4.72	2	2.8%	1.1%	0.0806
1997	188	65,500	44	4.27	2	2.3%	0.9%	0.0636
1998	102	40,900	34	3.00	2	2.9%	1.6%	0.1158
1999	92	49,600	33	2.79	2	3.0%	1.7%	0.0716
2000	138	83,900	33	4.18	2	3.1%	1.3%	0.0706
2001	67	56,300	20	3.35	2	5.0%	3.3%	0.1042
2002	70	55,200	32	2.19	2	3.1%	1.4%	0.1969
2003	67	45,400	35	1.94	2	2.9%	1.3%	0.1021
2004	98	37,100	46	2.13	2	2.2%	1.7%	0.0375
2005	15	57,600	12	1.25	1	8.3%	6.9%	0.1584
2006	70	158,000	30	2.53	2	3.3%	0.4%	0.1737
2007	121	459,000	37	3.65	2	2.7%	0.2%	0.1681
2008	78	106,000	29	2.79	2	3.4%	1.1%	0.1281
2009	112	202,000	41	2.80	1	2.4%	0.6%	0.1637
2010	349	482,000	56	6.34	3	1.8%	0.6%	0.0505
1990 — 2010	2,064	1,989,186	126	17	6	#	#	#

Investment banks enter and drop out from the market between 1990 and 2010. Calculating an average and median market share and an overall Herfindahl index in this 21-year period is thus not useful.

1.4.2. The political connections of investment banks

A common measure of a firm's political connections is the presence (or number) of politically connected directors (e.g., Agrawal and Knoeber, 2001; Hillman, 2005; Faccio, 2006). Unfortunately, the resumes of board members in Chinese investment banks are only scarcely disclosed. Yet, we could identify each bank's ultimate owner rather easily from its website or financial reports, which is usually either the central government or a local-level government. In general, the government that controls the investment bank appoints its board members, who are mostly current or former government officials (Fan *et al.*, 2007). Correspondingly, the board members in central-government-owned banks tend to have a higher political hierarchy, providing them with better access to CSRC officials. So, in line with Du and Girma (2010), we create a political hierarchy dummy equal to one if the investment bank is ultimately controlled by the central government, and zero otherwise. Considering the small number of private-owned banks in our sample, we include them in the same group as the banks controlled by a local-level government. In a (non-reported) robustness check, we excluded those five private banks from our sample and obtained similar results. In Section 1.5.3, we also test the robustness of our results when considering the political hierarchy of the city in which the investment bank has its headquarter.

We collected bank ownership information in every year, as ownership structure could change over time. Each of the 126 investment banks in our sample had an ultimate owner with a stake of at least 50%. The central government is the controlling shareholder in 8.1% of bank-year observations. Investment banks are thus mostly controlled by a local-level government. However, the stake of local governments has declined over time, especially as a result of the 1999–2001 M&A wave. They held majority control in 93.6% of bank-year observations before 2005; this was reduced to 81% afterwards.

1.4.3. The evaluation standard applied by investment banks

According to Chemmanur and Fulghieri (1994), issuers and investors assess an investment bank's evaluation standard by the after-listing performance of its IPO firms. Dunbar (2000) uses the first-year abnormal return in the aftermarket as a proxy. However, many scholars have argued that stock prices in China do not reflect the fundamental value of listed firms (Allen *et al.*, 2005; Pistor and Xu, 2005). One reason is that domestic stock exchanges are dominated by speculative retail investors, resulting in abnormally high stock turnover rates. Besides, many listed firms have (or had) a large fraction of non-tradable shares, owned by the State or by legal persons. We therefore relied on accounting data to calculate our main measure of a bank's evaluation standard. This choice was also justified by the direct link between accounting profits (earnings) and the IPO offer price, because of the fixed P/E ratio cap. Due to this unique IPO pricing mechanism, issuers had strong incentives to exaggerate their earnings to increase the offer price. Investment banks with a low evaluation standard may then either not detect or turn a blind eye on this earnings exaggeration. We use the industry-adjusted return on sales (ROS) as our main metric and implement a robustness check using industry-adjusted return on assets (ROA). Industry adjustments are based on the average ROS (ROA) for the 13 industry categories established by the CSRC. For every IPO firm, we calculated the change in industry-adjusted ROS (ROA) from one year before to one year after first listing. Finally, like Dunbar (2000), we also rely on post-IPO abnormal stock returns.

We proxy an investment bank's evaluation standard in a year by the average change in industry-adjusted ROS of the IPO firms it underwrote in the previous two years. A small decline in the industry-adjusted ROS of its issuers thus indicates that the bank adheres to a relatively strict standard. In this calculation, we weighed each IPO by its gross proceeds to account for the larger visibility of big IPOs. Besides, we report results when all IPOs are equally weighed. The choice on how many lags to include is an empirical one. Including too many lags levels out any changes in the bank's evaluation standard over time, while including too few lags could introduce noise into

our measures. We therefore relied on a two-year time frame, but find that results are largely robust when using alternative lags.

Table 1.2, Panel A reports the average change in industry-adjusted accounting profitability of IPO firms between 1993 and 2010. In line with previous studies (e.g., Wang, 2005; Kao *et al.*, 2007), firm performance deteriorates significantly after first listing. To verify our earnings-inflation conjecture, we compare total accruals scaled by sales in the IPO year with this same variable in the post-IPO year (see also Teoh *et al*., 1998).[9] Due to data limitations, we could obtain accruals data only as of 1998. We find that for the firms listed in 1998–2010, accruals amplified earnings much more in the IPO year than in the year thereafter. This finding, shown in Panel B of Table 1.2, suggests that the deterioration in industry-adjusted ROS (ROA) indeed came from earnings manipulation. Next, Panel A reveals that the decline in firm performance is significantly *larger* for the firms listed after 2005. The industry-adjusted ROS of those IPO firms drops by seven percentage points on average; this number was only three percentage points before.[10] A simple *t*-test rejects the null hypothesis that these averages are identical (p-value < 0.001). Interestingly, the *after-IPO* industry-adjusted ROS (ROA) is not significantly different across both subperiods. Rather, it is the *before-IPO* industry-adjusted ROS (ROA) that differs: firms listed after 2005 exhibit significantly better pre-IPO accounting performance than those listed before. Arguably, these results suggest that issuers have inflated their *before*-IPO earnings to a larger extent in the second subperiod of our analysis, after the regulatory changes.

[9] We have no accruals data for the pre-IPO year. Yet, Teoh *et al*. (1998) show that earnings exaggeration by accruals is strongest in the IPO year itself. Similar conclusions were obtained for China by Aharony *et al.* (2000), Ding *et al.* (2007) and Kao *et al.* (2009).

[10] In China, all listed firms had to implement IFRS after 2007. However, we find that the firms becoming listed as of 2007 still show a significant decline in their industry-adjusted ROS from one year before to one year after their IPO.

Table 1.2: Comparison of firm performance from before to after the IPO.

Panel A reports summary statistics on the industry-adjusted ROS and industry-adjusted ROA. Those measures of firm performance are shown for the year before the IPO and for the year after the IPO. The change in firm performance is subsequently calculated by subtracting the before-IPO performance measure from the after-IPO measure. Results are shown for IPOs in the period 1993 till 2010 and for two subperiods: 1993–2004 and 2005–2010. We also perform a test on the equality of means; the *p*-values of this *t*-test are reported in the column 'Comparison of the means'.

Panel B reports summary statistics on sales-scaled total accruals, which is calculated as the difference between the IPO firm's operating cash flow and its earnings divided by sales. We calculate sales-scaled accruals in the IPO year and in the year after the IPO. The data necessary to calculate this variable are available only as of 1998. Results are shown for the period 1998 till 2010 and for two subperiods: 1998–2004 and 2005–2010. We also perform a test on the equality of means; the *p*-values of this *t*-test are reported in the column 'Comparison of the means'.

Panel A: Changes in industry-adjusted ROS and ROA

	1993–2010			**1993–2004**			**2005–2010**			**Comparison of the means**
Variables	**Obs.**	**Mean**	**Median**	**Obs.**	**Mean**	**Median**	**Obs.**	**Mean**	**Median**	***p*-value H_0=equal means**
Industry-adjusted ROS one year before IPO	1,674	0.10	0.08	1,011	0.08	0.06	663	0.13	0.11	<0.01
Industry-adjusted ROS one year after IPO	1,686	0.05	0.04	1,023	0.04	0.04	663	0.05	0.05	0.29
Change in industry-adjusted ROS from one year before to one year after the IPO	1,602	-0.04	-0.03	973	-0.03	-0.02	629	-0.07	-0.06	<0.01
Industry-adjusted ROA one year before IPO	1,652	0.07	0.06	1,000	0.05	0.04	652	0.09	0.08	<0.01
Industry-adjusted ROA one year after IPO	1,744	0.03	0.03	1,082	0.02	0.02	662	0.04	0.04	0.30
Change in industry-adjusted ROA from one year before to one year after the IPO	1,652	-0.04	-0.03	1,000	-0.03	-0.02	652	-0.06	-0.05	<0.01

Panel B: Sales-scaled accruals

	1998–2010			**1998–2004**			**2005–2010**			**Comparison of the means**
Variables	**Obs.**	**Mean**	**Median**	**Obs.**	**Mean**	**Median**	**Obs.**	**Mean**	**Median**	***p*-value H_0=equal means**
Sales-scaled accruals in the IPO year	851	0.059	0.031	484	0.068	0.042	367	0.048	0.022	0.25
Sales-scaled accruals one year after the IPO	851	0.016	0.001	484	0.031	0.006	367	-0.002	-0.005	<0.01
Change in sales-scaled accruals from the IPO year to one year after the IPO	851	-0.043	-0.031	484	-0.037	-0.036	367	-0.051	-0.028	<0.01

1.4.4. The abnormal underpricing offered by investment banks

We rely on a standard model to explain IPO underpricing, typically proxied by the first-day abnormal return in every A-share IPO. Following Huyghebaert and Quan (2009) and Tian (2011), this model includes seven explanatory variables: the log of gross IPO proceeds, a dummy equal to one if the firm issued B, H, N or S shares[11] before its A-share offering, a dummy equal to one if the

[11] H shares are listed on the Hong Kong stock exchange. N shares are listed on the New York stock exchange. S shares are listed on the Singapore stock exchange.

firm is privately owned, a dummy equal to one if the firm operates in a regulated industry, the log of the number of days between share offering and share listing, the market return from one year before listing to the actual listing date, and a dummy equal to one if the firm becomes listed in Shanghai. We run the regression for every sample year, using all IPOs in the previous two years. This modelling thus allows accounting for potential changes in the determinants of IPO underpricing over time, as stock markets became more developed. Table 1.3 reports the results. In line with prior research, the explanatory variables can explain up to 57% of the total variation in first-day abnormal returns. Thereby, the log of gross IPO proceeds has a significant negative effect in all years, while the market return has a significant positive impact in eleven years. The other variables are significant in only two to five years.

For every IPO, we calculate its normal underpricing level using the parameter estimates in Table 1.3. The IPO's abnormal underpricing is then computed by subtracting its expected underpricing level from the realized first-day abnormal return. For every investment bank in every year, we proxy its accuracy as regards IPO underpricing by averaging the abnormal underpricing in all IPOs it advised in the previous two years, using gross IPO proceeds as weighting factor. Again, we also report results when all IPOs are equally weighted. In a (non-reported) robustness check, we relied on the average realized first-day abnormal return of all IPOs advised by a bank in the previous two years (without subtracting the conditional mean) to avoid a generated-regressor bias and found no impact on results.

Table 1.3: OLS regression results on first-day abnormal returns.

This table reports the results of an OLS regression model that explains the first-day abnormal return for the firms listed in years *t–1* and *t–2*. The first-day abnormal return is calculated as the realized first-day return minus the market return between share issuing and share listing. We regress those first-day abnormal returns on the log of gross IPO proceeds, a dummy equal to one if the firm issued B, H, N or S shares before its A-share offering (Foreign), a dummy equal to one if the firm is majority-owned by private owners (Private-firm IPO), a dummy equal to one if the firm operates in a regulated industry (Regulated industry), the log of the number of days between share issuing and share listing, the market return from one year before listing till the listing day, and a dummy equal to one if the firm becomes listed in Shanghai (Market dummy). *p*-values are reported between parentheses. Coefficients significant at the 1%, 5% and 10% level are indicated with ***, **, *, respectively.

Year	Intercept	Log of gross proceeds	Foreign	Private-firm IPO	Regulated industry	Log of listing lag	Market return	Market dummy	Adjusted R-squared	Number of obs.
1995	16.223**	-0.940***	0.615	-0.032	0365	0.438*	0.722	0.713**	40%	27
	(0.012)	(0.008)	(0.121)	(0.856)	(0.921)	(0.070)	(0.213)	(0.039)		
1996	7.079***	-0.379***	0.592**	0.226	0.248***	0.044	0.620***	0.586***	57%	140
	(0.010)	(<0.001)	(0.017)	(0.540)	(0.001)	(0.731)	(<0.001)	(<0.001)		
1997	4.350***	-0.159**	0.276	0.295	0.175*	-0.098	0.311***	0.037	16%	294
	(<0.001)	(0.020)	(0.115)	(0.138)	(0.097)	(0.292)	(<0.001)	(0.702)		
1998	13.396***	-0.668***	0.174	0.167	-0.044	0.313	0.879***	0.090	41%	257
	(<0.001)	(<0.001)	(0.292)	(0.389)	(0.734)	(0.199)	(0.001)	(0.116)		
1999	15.908***	-0.798***	-0.181	0.247	0.309*	0.197	1.626***	-0.052	41%	181
	(<0.001)	(<0.001)	(0.392)	(0.146)	(0.072)	(0.417)	(0.001)	(0.649)		
2000	13.302***	-0.580***	-0.489***	0.118	0.222	-0.178*	0.942**	0.026	26%	198
	(<0.001)	(<0.001)	(0.001)	(0.368)	(0.111)	(0.067)	(0.013)	(0.821)		
2001	17.163***	-0.802***	-0.306**	0.094	0.009	0.151	-0.163	-0.049	44%	167
	(<0.001)	(<0.001)	(0.033)	(0.449)	(0.938)	(0.229)	(0.611)	(0.821)		
2002	15.262***	-0.691***	0.043	-0.296**	0.108	0.084	0.899**	0.340	49%	116
	(<0.001)	(<0.001)	(0.822)	(0.034)	(0.339)	(0.617)	(0.041)	(0.248)		
2003	11.289***	-0.468***	0.072	-0.395***	0.174	-0.275	-0.608	-0.284	37%	122
	(<0.001)	(<0.001)	(0.740)	(0.001)	(0.160)	(0.238)	(0.266)	(0.158)		
2004	5.956***	-0.290***	0.276*	-0.149*	0.070	0.187	0.906	0.011	15%	137
	(0.001)	(0.001)	(0.094)	(0.068)	(0.433)	(0.457)	(0.116)	(0.935)		
2005	5.933**	-0.299**	0.258***	-0.093	0.108	0.283	2.866***	-0.236	20%	88
	(0.033)	(0.032)	(0.001)	(0.349)	(0.412)	(0.313)	(0.001)	(0.277)		
2006	6.922***	-0.290**	0.014	0.085	0.420*	-0.268	0.464***	0.212	35%	75
	(0.002)	(0.011)	(0.951)	(0.387)	(0.093)	(0.372)	(0.005)	(0.464)		
2007	8.299***	-0.420***	0.332	-0.003	0.301	0.077	1.290***	0.461	46%	175
	(0.001)	(0.001)	(0.309)	(0.984)	(0.190)	(0.847)	(<0.001)	(0.157)		
2008	10.015***	-0.458***	0.405	-0.055	0.105	0.115	0.652***	0.399	40%	174
	(<0.001)	(0.001)	(0.227)	(0.759)	(0.529)	(0.569)	(<0.001)	(0.259)		
2009	9.719***	-0.470***	0.306	-0.184	-0.090	0.296	0.123	0.653**	26%	173
	(<0.001)	(<0.001)	(0.557)	(0.119)	(0.428)	(0.123)	(0.242)	(0.029)		
2010	6.012***	-0.271***	0.143	0.187**	0.010	0.060	0.334***	0.055**	23%	436
	(<0.001)	(<0.001)	(0.540)	(0.011)	(0.814)	(0.323)	(<0.001)	(0.029)		

1.4.5. The number of star analysts employed by investment banks

At the end of 2003, the magazine New Fortune first published its annual report on previous-year star analysts, based upon the votes from peers and buy-side fund managers. For every investment bank in every year, we construct a dummy variable that equals one when it employed at least one star analyst in that year. Besides, we relate its number of star analysts to the total number of star analysts in that year. Table 1.4 reports summary statistics. Between 2004 and 2010, the number of star analysts increased by a factor four, while the number of investment banks employing at least one star analyst doubled. A more detailed analysis of the data (not shown) reveals that the ranking

of star analysts became more stable after 2008, suggesting that financial analysts were able to build their reputation over time.

Table 1.4: Summary statistics on the number of star analysts.

This table summarizes the number of star analysts employed by Chinese investment banks in 2004–2010. Information on the number of star analysts was obtained from New Fortune's annual report of financial analysts.

Year	Total number of star analysts	Total number of investment banks that employ at least one star analyst in that year	Average number of star analysts among investment banks that employ at least one star analyst	Maximum number of star analysts employed by an investment bank, if positive
2004	26	6	4.3	11
2005	84	10	8.4	25
2006	34	4	8.5	16
2007	104	14	7.4	28
2008	97	16	6.1	22
2009	134	13	10.3	21
2010	116	13	8.9	24

1.4.6. The abnormal underwriting fees charged by investment banks

IPO lead underwriters receive an underwriting fee and a sponsor fee. We could obtain the data on total floating costs – including the underwriting fee, sponsor fee, lawyer fee, auditing fee, and other listing costs – for 1,823 IPOs. As total floating costs were not always broken down into their components, we had no alternative but to relate an IPO's total floating costs to its gross proceeds. For the 180 IPOs on which we could collect the detailed information, we find that the underwriting fee and the sponsor fee accounted for about 81% of total floating costs. For the full sample, the floating cost rate averages to 4.3% (median of 4.7%). Prior to 2005, this average equals 4.0%, while it is 6.1% in 2005–2010. A parametric *t*-test (*p*-value < 0.001) as well as a non-parametric Kruskal-Wallis test (*p*-value < 0.001) reject the null hypothesis that floating cost rates remained constant over time. These findings indicate that fee rates in Chinese domestic IPOs fall in between those of European IPOs (average around 4%) and U.S. IPOs (average around 7%) (e.g., Torstila 2001; Abrahamson *et al.*, 2011).

Building on Bohren *et al.* (1997) and Dunbar (2000), we develop a model to explain the fee rate in Chinese domestic IPOs. So, we include the log of gross IPO proceeds and its quadratic term. This specification allows for a U-shaped relation between gross IPO proceeds and IPO fee rates (see also Altinkilic and Hansen, 2000). Next, to account for the special features of Chinese domestic

IPOs, we add a dummy equal to one for firms with B, H, N or S shares outstanding, a dummy equal to one for privately owned firms, a dummy equal to one for firms in regulated industries, the log of the number of days between share offering and share listing, and a dummy equal to one if the firm becomes listed in Shanghai. We again run year-by-year regressions, using all observable floating cost rates in the previous two years. In line with Dunbar (2000), Table 1.5 reveals a significant negative coefficient on the log of gross IPO proceeds, while its quadratic term has a significant positive sign. The variables accounting for the specific characteristics of Chinese domestic IPOs are usually not significant. Overall, the adjusted R-squared is quite high for most annual regressions.

Table 1.5: OLS regression results on fee rates.

This table reports the results of an OLS regression model that explains the floating cost rate for the firms listed in years *t–1* and *t–2*. We regress those floating cost rates on the log of gross IPO proceeds and its quadratic term, a dummy equal to one if the firm issued B, H, N or S shares before its A-share offering (Foreign), a dummy equal to one if the firm is majority-owned by private owners (Private-firm IPO), a dummy equal to one if the firm operates in a regulated industry (Regulated industry), the log of the number of days between share issuing and share listing, the market return from one year before listing till the listing day, and a dummy equal to one if the firm becomes listed in Shanghai (Market dummy). *p*-values are reported between parentheses. Coefficients significant at the 1%, 5% and 10% level are indicated with ***, **, *, respectively.

Year	Intercept	Log of gross proceeds	Square of log of gross proceeds	Foreign	Private-firm IPO	Regulated industry	Log of listing lag	Market dummy	Adjusted R-squared	Number of obs.
1995	0.244*	-0.119	0.003	-0.006*	0.002	0.000	-0.003	-0.014***	24%	38
	(0.085)	(0.113)	(0.139)	(0.087)	(0.516)	(0.919)	(0.138)	(0.001)		
1996	0.936	-0.079	0.002	0.014	0.001	0.004	0.003	-0.003	6%	156
	(0.376)	(0.425)	(0.898)	(0.155)	(0.935)	(0.650)	(0.372)	(0.696)		
1997	1.018***	-0.089	0.002	0.004	0.004	-0.000	0.001	-0.000	33%	264
	(<0.001)	(0.381)	(0.469)	(0.139)	(0.307)	(0.825)	(0.436)	(0.887)		
1998	1.147***	-0.101***	0.002***	0.001	0.002	-0.001	0.001	-0.000	62%	249
	(0.001)	(<0.001)	(<0.001)	(0.739)	(0.360)	(0.668)	(0.623)	(0.655)		
1999	1.340***	-0.020***	0.003***	0.000	-0.002	-0.001	0.002***	0.001	73%	160
	(<0.001)	(<0.001)	(<0.001)	(0.747)	(0.106)	(0.291)	(0.004)	(0.299)		
2000	0.1.185***	-0.102***	0.002***	0.000	-0.002	-0.002	0.001	0.001	75%	199
	(<0.001)	(<0.001)	(<0.001)	(0.898)	(0.204)	(0.158)	(0.221)	(0.420)		
2001	1.192***	-0.012***	0.002***	0.002	-0.001	-0.000	-0.001	0.001	62%	163
	(<0.001)	(<0.001)	(<0.001)	(0.420)	(0.225)	(0.979)	(0.154)	(0.532)		
2002	1.299***	-0.113***	0.0025***	0.003*	-0.003**	-0.001	-0.001	0.002	62%	116
	(<0.001)	(<0.001)	(<0.001)	(0.061)	(0.011)	(0.613)	(0.192)	(0.127)		
2003	1.129***	-0.096***	0.002***	0.003	0.001	-0.002	-0.002	_	64%	120
	(<0.001)	(<0.001)	(<0.001)	(0.171)	(0.646)	(0.173)	(0.138)			
2004	0.739***	-0.618***	0.001***	-0.001	0.003**	-0.002	0.007	_	52%	131
	(<0.001)	(<0.001)	(<0.001)	(0.805)	(0.050)	(0.368)	(0.188)			
2005	0.509	-0.036	0.001	-0.006	-0.001	0.001	0.006	-0.007	40%	89
	(0.238)	(0.394)	(0.549)	(0.779)	(0.691)	(0.799)	(0.259)	(0.101)		
2006	1.126***	-0.094	0.002	-0.003	-0.001	-0.002	0.006	-0.004	36%	75
	(<0.001)	(0.291)	(0.375)	(0.986)	(0.994)	(0.575)	(0.155)	(0.182)		
2007	2.818***	-0.246***	0.005***	-0.001	0.002	-0.006*	-0.004	0.010	82%	175
	(<0.001)	(<0.001)	(<0.001)	(0.295)	(0.409)	(0.074)	(0.345)	(0.170)		
2008	2.556***	-0.220***	0.005***	0.001	-0.002	0.001	-0.006*	0.004	80%	174
	(<0.001)	(<0.001)	(<0.001)	(0.930)	(0.384)	(0.824)	(0.077)	(0.283)		
2009	2.689***	-0.230***	0.005***	0.001	-0.003	0.001	-0.001	-0.001	80%	173
	(<0.001)	(<0.001)	(<0.001)	(0.786)	(0.133)	(0.525)	(0.120)	(0.971)		
2010	2.324***	-0.199***	0.004***	0.001	-0.001	0.004	-0.004	-0.005	62%	436
	(<0.001)	(<0.001)	(<0.001)	(0.981)	(0.815)	(0.194)	(0.204)	(0.564)		

Note: in 2001–2003, only one firm became listed in Shenzhen; therefore, the market dummy was omitted from the 2003 and 2004 regressions.

1.4.7. Summary

Our panel data set includes information on 126 investment banks and 16 years. As not all investment banks existed in all years and as data on some of the explanatory variables are missing in some of the years, the panel is unbalanced. Table 1.6 reports summary statistics on the explanatory variables. From the correlation matrix (not reported), we infer that multicollinearity problems are unlikely. This conclusion also arises from examining the variance inflation factors, which are always less than five. In a non-reported robustness check, we removed the 5% most influential observations and found that our results are qualitatively unchanged.

Table 1.6: Summary statistics for the variables used in the multivariate analyses.

This table reports summary statistics on the investment-bank market share, the political hierarchy dummy, the gross-proceeds weighted average change in industry-adjusted ROS, the gross-proceeds weighted average abnormal underpricing, the star analysts dummy, and the gross-proceeds weighted average abnormal fee rate. In Panels A and B, the summary statistics cover the two subperiods: 1995–2004 and 2005–2010, respectively.

Panel A: 1995–2004

Variable	Obs. Bank year	Mean	Median	Std. Dev.	Min.	Max.
Investment-bank market share	229	0.037	0.022	0.049	0.000	0.422
Political hierarchy dummy	229	0.279	-	-	-	-
Gross-proceeds weighted average change in industry-adjusted ROS	229	-0.017	-0.015	0.067	-0.310	0.288
Gross-proceeds weighted average abnormal underpricing	229	-0.023	-0.053	0.572	-2.902	2.428
Gross-proceeds weighted average abnormal fee rate	229	0.009	0.020	0.058	-0.111	0.287

Panel B: 2005–2010

Variable	Obs. Bank year	Mean	Median	Std. Dev.	Min.	Max.
Investment-bank market share	149	0.036	0.009	0.063	0.000	0.344
Political hierarchy dummy	149	0.362	-	-	-	-
Gross-proceeds weighted average change in industry-adjusted ROS	149	-0.069	-0.053	0.075	-0.488	0.096
Gross-proceeds weighted average abnormal underpricing	149	0.023	-0.009	0.369	-0.967	1.791
Star analysts dummy	149	0.436	-	-	-	-
Gross-proceeds weighted average abnormal fee rate	149	-0.007	0.018	0.202	-0.186	0.333

[#] The star analyst dummy is not included in the regressions for the subperiod 1995–2004.

1.5. Multivariate analyses and results

We rely on a system GMM model to run the multivariate analyses; this model is based on Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). We first introduce the methodology and discuss the regression output thereafter. We end this section with a discussion of the results from various robustness checks.

1.5.1. Methodology

Our main regression model looks as follows:

$$MS_{i,t} = b_1 MS_{i,t-1} + b_2 Pol.Conn_{i,t-1} + b_3 Eval.Stand_{i,t-1} + b_4 Abn.Underpr_{i,t-1} + b_5 SA_{i,t-1} + b_6 Abn.Fee_{i,t-1} + C_i + b_t Year_t + \varepsilon_{i,t} \quad (1)$$

with:

$MS_{i,t}$: Market share of investment bank *i* in year *t.*

$Pol.Conn_{i,t-1}$: Dummy equal to one if the investment bank is ultimately controlled by the central government in year *t–1*, and zero otherwise.

$Eval.Stand_{i,t-1}$: Weighted average of the change in industry-adjusted ROS of all IPOs advised by investment bank *i* in years *t–1* and *t–2*. All IPOs are weighed by their gross proceeds.

$Abn.Underpr_{i,t-1}$: Weighted average of the abnormal underpricing of all IPOs advised by investment bank *i* in years *t–1* and *t–2*, using gross IPO proceeds as weighting factor.

SAi,t–1: Dummy equal to one if investment bank i employed at least one star analyst in year t–1.

$Abn.Fee_{i,t-1}$: Weighted average of abnormal fee rates in all IPOs advised by investment bank *i* in years *t–1* and *t–2*, using gross IPO proceeds as weighting factor.

C_i : Individual effect of investment bank *i.*

$Year_t$: Year dummy for year *t.*

Dunbar (2000) uses the change in market share over a one-year window as dependent variable. This treatment is equivalent to fixing the coefficient on the lagged market share variable to one in equation (1). In well-funtioning financial markets, this assumption can still be defended. However, in China, where stock exchanges were only recently re-established, the influence of one-year lagged market share on current-year market share may be far less than one. We therefore add the lagged market share variable as an extra regressor (see also Rau, 2000).

We adopt a panel data methodology to estimate equation (1), with observations identified by investment bank and by year. A standard way to account for the investment-bank individual effect is by using either a random-effects or a fixed-effects specification. However, these models may produce biased parameter estimates once the lagged dependent variable is added to the model (Nickell, 1981; Beggs and Nerlove, 1988). Anderson and Hsiao (1981) offer a solution based on a first-difference transformation, from which the individual effect C_i drops out. To deal with the correlation between $(y_{i,t-1} - y_{i,t-2})$ and $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$, the variable $y_{i,t-2}$ can be used as an instrument for $(y_{i,t-1} - y_{i,t-2})$.[12] Arellano and Bond (1991) point out that this instrument construction method applies to any other predetermined explanatory variable whose current value may be affected by past shocks in the dependent variable. We consider $Eval.Stand_{i,t-1}$, $Abn.Underpr_{i,t-1}$, $SA_{i,t-1}$ and $Abn.Fee_{i,t-1}$ as such predetermined variables. To check the validity of the instruments, we rely on the Arellano-Bond test.

Based on Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) develop a more efficient estimation method by including level equations into the GMM. Specifically, they construct a system GMM with two parallel equations: the first-difference equation and the level equation. They show that if the individual effects are not correlated with the first observation of the first-differenced explanatory variables, the lagged first difference can be used as an instrument for the level explanatory variables, while the lagged values of the levels can serve as instrument in the first-difference equation. The joint estimation of the level equation and the first-difference equation can improve efficiency. So, we opted for a two-step system GMM estimation, which also accounts for possible heteroskedasticity and correlations among the error terms. As Arellano and Bond (1991) note that the standard errors are often under-estimated in a

[12] We use only one lag of the explanatory variable as instrument, but implemented robustness checks using two lags; results proved similar. However, we do find that the significance level of the instrumented variables drops considerably when using more than two lags, which can be attributed to the considerably smaller sample size to estimate the ensuing models.

two-step GMM dynamic panel data model, we calculate *p*-values using Windmeijer-adjusted standard errors (Windmeijer, 2005).

Table 1.7: Determinants of investment-bank market shares in Chinese domestic IPOs.

Model 1 in this table reports the OLS regression results when the current-year market share is regressed on the last-year market share. Next, model 2 reports the results of a two-step system GMM regression, where current-year investment-bank market share is regressed on the bank's previous-year market share, a dummy that equals one if the bank is ultimately controlled by the central government in the previous year, the average change in industry-adjusted ROS of all IPOs advised by the bank in the previous two years, the average abnormal underpricing of all IPOs advised by the bank in the previous two years, a dummy that equals one if the bank employs at least one star analyst in the previous year, and the average abnormal fee rate in all IPOs advised by the bank in the previous two years. In this model, all explanatory variables are weighted by the IPO's gross proceeds. Model 3 reports the results when all explanatory variables are calculated using equal weights for all IPOs in the two-year historical window. The regression models always include year dummies. *p*-values are reported between parentheses. The *p*-values are calculated using Windmeijer-adjusted standard errors. We also report the *p*-value from the Arellano-Bond test to verify the validity of the instruments; a high *p*-value means that the validity of the instruments cannot be rejected. Coefficients significant at the 1%, 5% and 10% level are indicated with ***, **, *, respectively. Finally, the last two columns in the table (Coefficient comparison) report the *p*-values from a *t*-test that examines the null hypothesis that the parameter estimates in the two subperiods are identical to one another.

	1995–2004			2005–2010			Coefficient comparison	
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 2	Model 3
Intercept	0.020*** (<0.001)	0.033** (0.049)	0.080 (0.365)	0.009* (0.060)	-0.026** (0.017)	-0.011 (0.343)		
Last-year market share	0.456*** (<0.001)	0.147 (0.231)	0.112 (0.367)	0.737*** (<0.001)	0.382*** (<0.001)	0.325** (0.013)	0.009***	0.021**
Political hierarchy dummy		0.074** (0.013)	0.069* (0.059)		0.058** (0.030)	0.049** (0.035)	0.050**	0.069*
Gross-proceeds weighted average change in industry-adjusted ROS		0.090 (0.413)			-0.210** (0.050)		0.036**	
Equally weighted average change in industry-adjusted ROS			0.038 (0.891)			-0.134*** (0.001)		0.001***
Gross-proceeds weighted average abnormal underpricing		0.014 (0.157)			0.000 (0.998)		0.554	
Equally weighted average abnormal underpricing			0.015 (0.302)			-0.010 (0.551)		0.206
Star analysts dummy					0.015 (0.500)	0.017 (0.455)		
Gross-proceeds weighted average abnormal fee rate		0.064 (0.719)			-0.051* (0.086)		0.061*	
Equally weighted average abnormal fee rate			0.050 (0.843)			-0.108* (0.087)		0.065*
Year dummies		Yes	Yes		Yes	Yes		
p-value of Wald Chi-square test		<0.001	<0.001		<0.001	<0.001		
p-value of Arellano-Bond test		0.592	0.961		0.320	0.275		
Adjusted R-squared	0.221			0.658				
Number of observations	953	229	229	543	149	149		

Table 1.7 reports the output of three regression models. Model 1 is an OLS model that only includes the last-year market share as explanatory variable. Model 2 is a system GMM model that uses a gross-proceeds weighted average calculation for the change in industry-adjusted ROS, abnormal underpricing, and the abnormal fee rate, while Model 3 relies on equally weighted averages.

1.5.2. Discussion of the results

When the lagged market share is the only explanatory variable, we find that it has a significant positive effect in both subperiods. However, the coefficient is far smaller in the first subperiod. Also, once the full set of test variables is added to the model, the lagged market share variable becomes insignificant in 1995–2004. These results thus indicate that market shares were far from stable in the early years after stock market re-establishment. Yet, following repeated market interactions, market shares started to show at least some persistency in more recent years. After 2005, we indeed find a parameter estimate of about 0.35 in Models 2–3. This number is still far smaller than one, implying that a high market share in one year is hardly a guarantee for an equally high market share in the subsequent year.

Before 2005, political connections significantly positively influenced investment-bank market shares. Specifically, Models 2 and 3 show that an investment bank ultimately controlled by the central government could expect a market share that was about 7% larger than that of an investment bank with other owners, ceteris paribus. This advantage is economically meaningful, as the average market share in the years 1995–2004 was only 3.7%. After 2005, investment banks controlled by the central government still enjoyed a competitive advantage, but at a lower level (about 5%). Standard *t*-tests in the table point out that the influence of political connections is

significantly larger in the first subperiod.[13] Overall, our results on the role of political connections are in line with Hypothesis 1.

Next, all models reveal that an investment bank's evaluation standard is not significant before 2005. In support of Hypothesis 2, this variable becomes significantly and negatively associated with investment-bank market shares after 2005. Also, the effect is more pronounced when accounting for the larger visibility of big IPOs, i.e. in Model 2. Based upon Model 2, we conclude that an investment bank can expect a 0.21% increase in its market share for a 1% reduction in its evaluation standard (measured by the average change in industry-adjusted ROS from one year before to one year after the IPO for all IPOs it underwrote in the previous two years). This outcome contradicts the theoretical predictions of Booth and Smith (1986) and Chemmanur and Fulghieri (1994). Then again, incentives to hire lead underwriters with a high evaluation standard were largely absent in China over the last two decades. Rather, investment banks with a low evaluation standard allowed IPO candidates to inflate their earnings to increase the IPO offer price. When running robustness checks using the average change in industry-adjusted ROS of IPO firms advised in a three-year historical window (not reported), results are similar to those in Table 1.7. However, when using a one-year lag, the evaluation standard variable still has a negative coefficient, but is no longer significant (*p*-value of 0.371). Nonetheless, we have to consider that about half of the investment banks underwrote less than two IPOs in most years (Table 1.1), which could reduce the validity of the latter test. Next, we calculated the average change in industry-adjusted ROS up to two years after the IPO. The latter variable also has a significant negative sign (coefficient of -0.135; *p*-value of 0.082). The magnitude of the latter parameter estimate probably

[13] As the Chinese domestic IPO market changed dramatically over time, one may worry that changes in firm characteristics (average and standard deviation) produce or contribute to the changes in parameter estimates from before to after 2005. In a (non-reported) robustness test, we standardized all variables – except for the dummy variables – in each subperiod and re-run the regressions on those standardized variables, to obtain the standardized regression coefficients. We then again compared the corresponding parameter estimates in the two subperiods, finding that results are similar to those in Table 1.7.

indicates that part of the earnings (accruals) have already reversed by the end of the first post-IPO year.

As expected, the coefficient on average abnormal underpricing is significant neither in the first subperiod nor in the second. This outcome thus confirms Hypothesis 3, as the CSRC was a highly influential factor in setting the IPO offer price up till June 10, 2009. During almost the entire sample period, investment banks in China had only limited influence on how much money was left on the table by setting IPO offer prices. Consequently, investment banks' market share in Chinese domestic IPOs did not depend upon whether IPOs were properly underpriced. In a non-reported robustness check, we left out the data as of June 10, 2009. Average abnormal underpricing remains insignificant in this case, with a *p*-value that is now even larger (*p*-value of 0.925). Unfortunately, the size of our dataset does not allow running these same regressions using only the IPOs as of June 10, 2009.

We fail to find supporting evidence for the idea that star analysts significantly enhance the market share of investment banks in the second subperiod (Hypothesis 4). When we measure this variable in an alternative way, i.e. the fraction of total star analysts employed by the investment bank, we still find no significant effect. Two arguments could explain these results: 1) Possibly, star analysts in China need more time to build their reputation; issuers also need extra time to realize that research coverage by star analysts can sustain stock prices. 2) Many listed firms in China are still controlled by the State; managers in those firms are not exposed to the threat of an external takeover as much as managers in private-controlled firms in Western economies. In sum, we recognize that data over a longer time interval, possibly also including more data on private-firm IPOs, is needed to draw more definite conclusions on the relation between star analysts and investment-bank market shares in China.

Finally, the abnormal fee rate in Chinese domestic IPOs has no significant impact on the market share of investment banks in the first subperiod. In the second subperiod, the abnormal fee rate does become significant, thereby confirming Hypothesis 5. Model 2 reveals that after 2005, an

investment bank could gain about 0.05% in market share when setting its fee rate 1% below the normal fee rate.

As a further robustness check (not reported), we split the sample period by Dec. 31, 2003, which is when the CSRC stopped its annual verification of underwriters. Results prove similar, except that the average change in industry-adjusted ROS no longer meets the 10% significance level (*p*-value of 0.260). Next, we split the sample by Feb. 28, 2004, which is when constraints on underwriting fees were lifted. The above results again remain valid, yet the significance level for the coefficient on the investment bank's evaluation standard again increases (*p*-value of 0.251). The above changes in significance levels are understandable, as we now include the IPOs in either the 12- or 10-month period during which the CSRC still directly influenced IPO market shares under the channel mechanism in the second subperiod. As regards the abnormal fee rate, we find no major change in parameter estimate/ significance level when using Feb. 28, 2004 as structural break date, which is in line with our argument that the abolition of the fee restrictions enabled investment banks to compete for market share by differentiating their fee rates only for firms becoming listed a few months later.

1.5.3. Robustness checks

Table 1.8 shows the output of a number of additional robustness checks. Models 1–3 present the results when using alternative variables to proxy for the theoretical constructs. Models 4–6 report on several extensions of the base model. The results from those extra analyses generally confirm those in Table 1.7.

Du *et al.* (2012) use the political hierarchy of the city in which an SOE has its headquarter to examine the relation between political connections and SOE annual performance rankings by the State Asset Council. As Beijing is the political center of China and as Shanghai is the economic and financial center, Du *et al.* assign the highest political hierarchy to these two cities. They find that SOEs with a head office in either Beijing or Shanghai obtain a higher performance ranking,

everything else constant. So, as an alternative way to measure political connections, we collected the data on the head-office location of investment banks. About 25% of the investment banks in our sample have their headquarter in Beijing or in Shanghai. Table 1.8, Model 1 shows that this allows them to secure a larger market share in IPOs. Again, this effect proves strongest in the first subperiod.

Next, we explore how alternative measurements of the investment bank's evaluation standard influence the results. In Model 2 of Table 1.8, we use the average change in industry-adjusted ROA. Results are in line with those in Table 1.7. Besides, we implement a robustness check using the average one-year post-IPO market-adjusted return of IPO firms underwritten in the previous two years. The results, displayed in column 3 of Table 1.8, reveal that this variable is never significant. While a non-significant parameter estimate is not in line with our findings based on accounting measures of firm performance (ROS and ROA), we have to keep in mind that stock prices in China may not always reflect the fundamental value of listed firms (e.g., Allen *et al.*, 2005; Pistor and Xu, 2005).

Dunbar (2000) argues that investment banks just entering the IPO underwriting market may focus on one specific industry to develop their expertise, while the more established banks may want to diversify their underwriting business across various industries to secure a more constant IPO flow. To examine the impact of industry specialization on investment-bank market shares, we classify an investment bank's IPOs in years *t–1* and *t–2* into each of the 13 industry categories established by the CSRC, from which we calculate a Herfindahl concentration index. We then add this index as an extra explanatory variable to our models. Model 4 in Table 1.8 shows that industry concentration is never significant. The Herfindahl index remains insignificant when calculated over a three-year historical window (*p*-value of 0.983; not reported).

We further note an increasingly larger number of privately owned firms becoming listed over time. Specifically, 83% of IPO firms in 2010 had a private controlling shareholder, compared to only 16% in 2000. So, and as an extension of the previous analysis on industry specialization,

we wish to examine whether investment banks building expertise on private issuers could expand their market share more easily. To test this idea, we construct a new variable *Private-IPO fraction*, which is the ratio of an investment bank's private-firm IPOs to its total number of IPOs in the previous two years. A higher value on this variable thus indicates that the investment bank focuses more on underwriting private-firm IPOs. Model 5 in Table 1.8 reveals that this variable is never significant; it remains non-significant when calculated over a three-year historical window (*p*-value of 0.707; not reported).

1.6. Conclusions

This paper examines the forces that have influenced the market share of investment banks in Chinese domestic IPOs between 1995 and 2010. In those 16 years, the market for A-share IPOs has grown from RMB 2 billion to RMB 482 billion in terms of gross IPO proceeds. Also, Chinese domestic IPOs accounted for 45% of the number and 39% of the gross proceeds of worldwide IPOs in 2010. Our results reveal that prior to 2005, stronger political connections alone were sufficient to ensure a considerable stake in IPO underwriting. After 2005, this effect declined, yet remains statistically and economically significant. Meanwhile, investment banks could further expand their market share by competing on services and fees. By setting a fee rate lower than the expected rate, investment banks were able to attract extra underwriting business. A more interesting result is that, unlike the findings for Western economies, investment banks that used a lower evaluation standard on IPO candidates were able to increase their market share in subsequent IPOs. We view this phenomenon as a result of the unique Chinese IPO pricing mechanism, which distorted the offer price in the primary market.

Table 1.8: Robustness checks on the determinants of investment-bank market shares in Chinese domestic IPOs.

This table reports the results of robustness checks using a two-step system GMM regression. Model 1 tests an alternative proxy for political connections, i.e. a dummy equal to one if the investment bank's headquarter is in Beijing or in Shanghai. Model 2 measures the investment bank's evaluation standard by the average change in industry-adjusted ROA from one year before to one year after the IPO for all IPOs advised by the bank in the previous two years, while model 3 relies on the average one-year post-IPO market-adjusted return of its previous IPOs. Model 4 explores the influence of industry concentration by adding the Herfindahl index for IPOs advised in the previous two years.Likewise, model 5 examines the influence of private-firm IPOs by adding the fraction of IPOs involving privately owned firms in a two-year historical window. The *p*-values are calculated using Windmeijer-adjusted standard errors. We also report the *p*-value from the Arellano-Bond test to verify the validity of the instruments. Coefficients significant at the 1%, 5% and 10% level are indicated with ***, **, *, respectively.

	1995–2004					2005–2010				
Models	1	2	3	4	5	1	2	3	4	5
Intercept	0.026 (0.807)	0.026 (0.693)	0.052 (0.673)	0.079 (0.298)	0.056 (0.655)	0.016 (0.780)	-0.020 (0.122)	0.026** (0.017)	0.041 (0.871)	-0.017 (0.266)
Last-year market share	0.195 (0.514)	0.141 (0.739)	0.043 (0.629)	0.104 (0.666)	0.066 (0.845)	0.348** (0.022)	0.350*** (0.001)	0.389*** (0.006)	0.300* (0.100)	0.347*** (<0.001
Political hierarchy dummy		0.067*** (<0.001	0.076** (0.048)	0.053** (0.014)	0.073* (0.082)		0.055** (0.029)	0.040** (0.034)	0.036 (0.519)	0.054* (0.057)
Political hierarchy dummy (by head-office location)	0.051*** (0.003)					0.044** (0.035)				
Gross-proceeds weighted average change in industry-adjusted ROS	0.051 (0.754)			0.057 (0.882)	0.013 (0.934)	-0.192* (0.076)			-0.201** (0.014)	-0.180** (0.034)
Gross-proceeds weighted average change in industry-adjusted ROA		-0.190 (0.739)					-0.233** (0.015)			
Gross-proceeds weighted average abnormal return in the aftermarket			-0.026 (0.125)					0.005 (0.312)		
Gross-proceeds weighted average abnormal underpricing	0.007 (0.451)	0.143 (0.680)	0.029 (0.356)	0.016 (0.419)	0.011 (0.578)	0.011 (0.651)	0.004 (0.693)	0.001 (0.970)	0.004 (0.942)	-0.002 (0.198)
Star analysts dummy						0.035* (0.099)	0.041 (0.220)	0.023 (0.329)	0.013 (0.935)	0.019 (0.320)
Gross-proceeds weighted average abnormal fee rate	0.067 (0.693)	0.037 (0.825)	0.044 (0.831)	-0.036 (0.932)	0.019 (0.897)	-0.065** (0.048)	-0.045 (0.135)	-0.053** (0.020)	-0.075 (0.353)	-0.055** (0.035)
Industry concentration				-0.031 (0.717)					0.005 (0.954)	
Private-IPO fraction					-0.026 (0.305)					-0.001 (0.585)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
p-value of Wald Chi-square test	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p-value of Arellano-Bond test	0.651	0.820	0.967	0.920	0.909	0.276	0.336	0.243	0.259	0.310
Number of observations	229	230	229	226	229	149	150	152	149	149

By focusing on the evolution of investment-bank market shares in Chinese domestic IPOs, our paper analyses a small, yet crucial aspect of Chinese reforms over the past 20 years. In the early years after stock market re-establishment, the regulator chose to directly interfere in the IPO market by assuming the role of market participants. By selecting the firms eligible for listing (before July 1999), the CSRC largely replaced the investment banks in examining the quality of IPO candidates. By approving IPO applications, the regulator also repealed investor demand for firm-quality certification by lead underwriters. By setting a fixed P/E ratio cap (before June 10,

2009), the CSRC restrained the pricing role of investment banks. By confining fee rates within a narrow range (before March 2004), the CSRC largely deprived investment banks from setting a price for their services. Possibly, such interferences were indispensable when financial markets were still immature; their side effects are obvious too, as shown in this article. First, we have clearly pointed out that although the CSRC undertook administrative efforts to incite investment banks to assume a certification role, its efforts achieved only little. Investment banks never gained market share by applying a strict evaluation standard on IPO candidates. Rather, CSRC intervention only prevented that banks with a high evaluation standard lost market share in the period 1995–2004. Once this *visible hand* was relaxed, those investment banks indeed started to lose market share. We therefore conclude that government intervention is hardly as efficient as the market mechanism in disciplining market participants. Next, we have demonstrated that government intervention has favoured investment banks with better political connections, which further questions its effectiveness. This mechanism remains non-trivial in most recent years. Finally, our results may also help to explain why the joint ventures established by foreign investment banks could obtain only a tiny stake in IPO underwriting, thereby putting a further constraint on competitive forces in the Chinese domestic IPO market. Indeed, foreign investment banks typically have a competitive advantage in terms of IPO certification and issuer valuation; those are skills that were accumulated over a long period of time and that underlie their reputation. However, our study demonstrates that those skills were appreciated neither by issuers nor by investors in Chinese domestic IPOs over the last two decades.

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CHAPTER 2

Over-issuance in Chinese domestic IPOs

2.1. Introduction

As of June 10, 2009, the Chinese regulator has fully ended its control over offer prices in Chinese domestic IPOs. Ever since, IPOs on the stock exchanges of Shanghai and Shenzhen have topped the world in terms of number and gross IPO proceeds (Ernst & Young, 2012). Recently, a new phenomenon has caught the attention of the regulator and the media: issuers raise much more finance than needed for their planned investment projects, as shown in their IPO application documents. We henceforth call this phenomenon '*over-issuance*'. Moreover, issuers seem to pay larger fees to their investment banks when raising excessive capital at IPO-time. One of the largest financial newspapers in China, the China Securities Times, revealed in its June 2010 edition: *"…most issuing firms include an 'over-issuance clause' in their underwriting contract with investment banks; this clause allows fee rates to increase with over-issuance...."* Despite media attention for over-issuance, academic research on this topic still falls short.

In this paper, we first provide empirical evidence on the importance of over-issuance in Chinese domestic IPOs during the period Jan. 1, 2010 – Dec. 31, 2011. During this time frame, Chinese IPOs were all *primary* share offerings by law, thereby raising new funds for the firms becoming listed. Issuers, together with their investment banks, have to apply for IPO permission by the China Securities Regulatory Commission (CSRC). In their IPO application documents, they have to specify the amount of capital needed for their planned investment projects and the number of shares they intend to sell. Deceiving the regulator by including unrealistic information as to the firm's investment projects could induce severe punishment on the issuer and on its underwriter(s). As IPO application documents are downloadable from the CSRC website, we were able to collect the data on the capital needed for prospective investment projects from those documents. After obtaining listing approval, issuers and investment banks conduct a price inquiry among institutional

investors in a bookbuilding procedure and decide on the final offer price and on the number of IPO shares to be sold. We define *over-issuance* as the ratio of net proceeds raised in the IPO to total capital required for the firm's planned investment projects, as disclosed in its IPO application documents. Net proceeds are gross proceeds minus investment-bank fees, auditing fees, lawyer fees, and any other IPO expenses. Among the 607 firms that listed as of Jan. 1, 2010 up till the end of 2011, we removed the IPOs of financial institutions, resulting in a final sample of 587 IPOs. For those firms, the average over-issuance equals 2.55 (median of 2.36). In total, RMB 299 billion of capital was raised without corresponding investment projects. Only 25 issuers (4.2% of sample firms) collected less funds than initially planned.

Next, we follow Kim and Weisbach (2008) to examine the usage of capital raised. We show that the over-issued capital is spent neither on extra investment outlays nor on paying down debt, but rather is accumulated in the cash and cash equivalents account. By the end of the second post-IPO year, the average issuer's cash holdings still amount to 78% of funds raised at IPO-time (median of 70%). On average, the cash-to-total-assets ratio equals 29% for IPO firms by the end of their second post-IPO year (median of 25%), while the average cash ratio for all listed firms is only 18% (median of 15%). In all industries, the cash ratio of IPO firms is significantly larger than the industry average. Together, this evidence suggests that issuers have raised too much capital at IPO-time, with no correspondence to real investment projects.

Why do issuers raise so much unnecessary capital in their IPO? Under the rational-agents framework and the (semi-strong) efficient-markets theory, raising external equity is costly, particularly at IPO-time. Ritter (2012) estimates that over the last decade the average issuer in the U.S.A. gave up 18 cents for every dollar raised, consisting of investment-bank fees and IPO underpricing (proxied by the first-day abnormal return). For China, the average investment-bank fee rate as of Jan. 2010 equaled 5.2%, while the average first-day abnormal return amounted to 33%. Issuers in China thus gave up 38.2 cents for every Yuan raised, either to investment banks or to primary-market investors. With such a huge issuing cost, one would expect issuers to avoid

raising excessive capital at IPO-time, to minimize the wealth losses for the firm's initial owners (Habib and Ljungqvist, 2001). The reality in the Chinese domestic IPO market has been quite the opposite. Over-issuance therefore seems like another anomaly under the rational-agents and efficient-markets framework. This anomaly may exist not only in China, though. Using a global database covering 38 countries (but not including Mainland China), Kim and Weisbach (2008) find that for every dollar raised in IPOs, firms' cash holdings had increased by 38.8 cents five years after the IPO. Raising too much capital at the IPO thus seems like a worldwide phenomenon. However, as far as we know, no other market has such strict disclosure requirements on prospective investment projects as China. By using data on Chinese domestic IPOs, we can examine the drivers of this over-issuance anomaly.

In this article, we propose an explanation of investor exploitation based on behavioral finance theory. Behavioral finance argues that capital markets misprice securities from time to time and that firms – or their managers – can take advantage of investors by issuing stock at a time it is overvalued (e.g., Loughran and Ritter, 1995; Baker and Wurgler, 2002; Rajan and Servaes, 2003). In the context of IPOs, behavioral finance theory would contend that issuers, together with their investment banks, may price IPO shares above intrinsic value at a time that stock market investors are overly optimistic. As those windows of opportunity are transitory in nature, issuers could try to fully exploit them by raising more finance than needed for their investment projects and, thus, accept the associated issuing costs. Indeed, while limiting the size of the primary offering and, hence, collecting extra funds in a subsequent seasoned offering could reduce the overall cost of raising a particular amount of external finance, the window of opportunity may be gone by that time. In other words, firms may no longer be able to sell their shares at the same high price if they *stage* their funds-raising process.

We examine several predictions arising from this behavioral finance explanation. Also, we contrast those conjectures with inferences made from rational-agents and semi-strong efficient-markets theory. Our empirical results support the former, while they reject the latter. First, if the

investor-exploitation explanation is true, primary shares will be sold above their intrinsic value to the overly optimistic investors in the IPO market (Miller, 1977). Strong investor optimism could then push stock prices even higher shortly after the IPO (Daniel *et al*., 1998; Purnanandam and Swaminathan, 2004); when investor overoptimism eventually fades away, stock prices will drop. Considering over-issuance as an appropriate indicator of investor enthusiasm for a firm's offering, we should be able to form investment portfolios based on over-issuance to realize an abnormal return under the investor-exploitation explanation for over-issuance. Conversely, under the rational-agents and efficient-markets theory, stock prices will incorporate all relevant information about the issuer at the time of first listing. Realizing an abnormal return based on publicly available information should then simply be impossible. Using over-issuance to proxy for the market sentiment as regards the IPO firm, we construct portfolios with a short (half a year) and a long (over one year) investment horizon after the IPO. The results point at a significant alpha after estimating Fama-French three-factor regression models. Those abnormal returns thus confirm the incidence of short-term investor overoptimism and the possibility to exploit it, in line with the behavioral finance literature.

Second, under the investor-exploitation explanation, over-issuance, the investment-bank fee rate, and the first-day abnormal return likely become endogenous. The reason is that higher over-issuance requires investment banks to exercise more marketing efforts to place the IPO shares. Besides, underwriting contracts usually include an engagement by the investment banks to buy any unsold IPO shares. Higher over-issuance thus also increases the odds that the IPO firm will exercise this option. Last but not least, investment banks associated with substantial over-issuance might suffer a reputation loss once the issuer's intrinsic value becomes known in the aftermarket. In order to deal with the above direct and indirect costs of over-issuance, investment banks could require a larger fee rate for higher over-issuance. In turn, when their fee rate depends on over-issuance, banks may price the IPO shares more aggressively and, thus, add to over-issuance. Next, investment banks usually underprice the IPO to some extent, to ensure primary-market investors'

participation in future IPOs. However, to realize a higher over-issuance, IPO firms and their underwriters have to increase the offer price, which will diminish the first-day abnormal return. Conversely, underpricing the IPO to a larger extent implies a lower offer price and, thus, lower over-issuance. Over-issuance should thus correlate negatively with the first-day abnormal return. In contrast, under the rational-agents and efficient-markets theory, over-issuance is not expected; it should therefore have no explanatory power for fee rates and first-day abnormal returns, *ceteris paribus*. Overall, our empirical results do confirm the endogeneity among over-issuance, investment-bank fee rates, and first-day abnormal returns. Specifically, over-issuance correlates positively with the fee rate, while it correlates negatively with the first-day abnormal return.

We thus conclude that investor exploitation is a plausible explanation for over-issuance in Chinese domestic IPOs. However, investor exploitation is not unique to China. As an example, Purnanandam and Swaminathan (2004) find that the median IPO firm in the U.S.A. in 1980–1997 was overvalued by 14% to 50% relative to its industry peers. They further conclude that issuers sell overvalued IPO shares to take advantage of transitory windows of opportunity in the stock market. Likewise, Pagano *et al.* (1998) document that Italian firms in 1982–1992 were more likely to go public when the price-to-book ratio in their industry was peaking. They explain this finding by issuers' attempt to exploit sectoral mispricing by stock market investors. Nonetheless, this earlier evidence on market timing and investor exploitation is subject to criticism, as it compares the multiples of IPO firms with those of already-listed industry peers (Kim and Ritter, 1999; Zheng, 2007). One could argue that the firms aiming for a stock market quotation have better growth prospects than their well-established industry peers. Other researchers have examined the performance of IPO firms in the aftermarket. In general, they find that issuing firms perform worse than benchmark firms in the long run (e.g., Ritter, 1991; Loughran and Ritter, 1995; Teoh *et al.*, 1998; Chan *et al.*, 2004). Yet, Ritter (2003) also stresses that finding evidence of *ex-post* underperformance does not necessarily imply *ex-ante* overvaluation. For one thing, issuers may become less risky after their stock market floatation and so their required return tends to decline as

well (Carlson *et al.*, 2006). Standard matching procedures typically fail to capture those dynamics in risk and return after a firm has become publicly listed.

The other, more important question that has remained unanswered in the literature so far is: even when IPOs are overvalued, does this overvaluation necessarily imply that issuers and investment banks *deliberately* time the market so as to *exploit* the overly optimistic investors? Or could issuers themselves also overvalue their firm, just like stock market investors do? Finding empirical evidence as regards this latter question is difficult. The reason is simple: no issuer would publicly announce his (true) valuation of the firm if he considers it to be overvalued by outside investors. Our research, using data on Chinese domestic IPOs, provides compelling evidence as to this investor-exploitation *intention*. The uniqueness of our study is its focus on the issue amount, which the IPO literature has generally treated as exogenous. Once considering investor-exploitation arguments, the issue amount may be set to take advantage of the overly optimistic investors in the stock market. Over-issuance is thus a decision made by issuers and their investment banks after bookbuilding has revealed investors' valuation of the IPO firm. Under the rational-agents and efficient-markets framework, raising external equity engenders costs at IPO-time; raising unnecessary finance thus engenders unnecessary costs. If issuers had agreed on the valuation of their firm by investors, they should have reduced the number of IPO shares to raise just enough capital for their planned investment projects. Only when issuers consider their firm to be overvalued by outside investors will raising excessive capital at the IPO be a profitable event, as predicted by investor-exploitation arguments. Investment banks, being afraid of harming their reputation among investors, could still limit the issue amount by setting a somewhat lower offer price (compared to the maximum price overoptimistic investors are willing to pay), thereby enhancing the first-day abnormal return; and/or they may charge a larger fee rate for higher over-issuance. Then, the issue amount, the fee rate, and the first-day abnormal return become endogenously related. Arguably, our findings add evidence to the investor-exploitation intention by both issuers and investment banks in the Chinese domestic IPO market.

The remainder of this paper is organized as follows. In Section 2.2, we briefly review the institutional aspects of Chinese domestic IPOs that are relevant to our analysis. In Section 2.3, we document the over-issuance phenomenon from Jan. 1, 2010 to Dec. 31, 2011 and examine whether the over-issued capital is really excessive. In Section 2.4, we present our potential explanations for over-issuance and infer the corresponding predictions. In Section 2.5, we empirically examine those conjectures. Section 2.6 concludes the paper.

2.2. Institutional background

The Shanghai and Shenzhen stock exchanges were re-established in 1990 and 1991, respectively. In Oct. 1992, the central government founded the China Securities Regulatory Commission (CSRC) to regulate Chinese securities markets. Since then, IPO rules have been designed, changed, and enforced by the CSRC, which falls under the direct supervision of the central government. By the end of 2011, 2,392 Chinese companies became listed in Shanghai or Shenzhen, with a total market capitalization of RMB 21.5 trillion. In the early years after stock market re-establishment, IPO firms were mainly state-owned enterprises (SOEs) that implemented a share issuing privatization (see Huyghebaert and Quan, 2009). In more recent years, private-controlled enterprises dominate the population of IPO firms. According to the CSMAR database, 83.8% of firms listing in either 2010 or 2011 had non-state owners controlling at least 50% of the firm's stock. Another special feature of Chinese domestic IPOs is that up till Dec. 31, 2013, issuers were only allowed to sell primary, i.e. newly issued shares at IPO-time.

Chinese investment banks had to develop their market share in IPO underwriting from scratch, along with the re-establishment of Chinese domestic stock exchanges. In 1993, the CSRC issued 'The circulation on enhancing the role of securities underwriters and professional intermediaries in stock offerings', which henceforth mandated every issuer to select an investment bank as lead manager for its IPO. Upon receiving a qualification from the CSRC, investment banks have to organize the whole IPO process, including an assessment of whether the IPO candidate

fulfils the issue conditions stipulated by the CSRC, preparing the IPO application materials and holding responsibility for their validity and accuracy, and – together with the issuer – fixing the final offer price and the number of shares offered. Though not required by regulation, investment banks in general commit themselves to buy any unsold IPO shares at the offer price under a firm-commitment underwriting contract. Next, as Chinese stock exchanges are organized on a computerized order-matching system, IPO underwriters are not asked to act as a market maker for the issuer's stock. However, in more recent years, particularly as of 2003, more and more investment banks do provide analyst research coverage after the firm's first listing.

The Chinese IPO mechanism was changed several times in recent history. As of July 1, 1999, with the enforcement of the China Securities Law, firms eligible for listing are no longer picked by the CSRC's local branches. Every company satisfying the listing criteria specified in the Securities Law can henceforth apply for a stock market quotation; and firms satisfying those criteria cannot be refused. Specifically, the applicant has to show positive earnings (net income) in each of the three years before its IPO. Also, it has to establish adequate internal control procedures and operate independently from other firms controlled by the same ultimate owner. Thereby, the CSRC fully relies on the firm's lead manager to check whether those conditions are fulfilled. This investment bank also has to submit the firm's IPO application documents, including a first draft of the prospectus, with the CSRC. In those documents, issuers have to provide details on their prospective investment projects, the amount of finance needed, and the number of primary shares they intend to sell. Once their application has been approved, issuers can still offer less shares than permitted, but can no longer increase the number of IPO shares. The information on planned investments has to be included in the IPO prospectus as well. This action is not gratuitous, as the CSRC claims that it will follow up on the progress of issuers' projects. Also, deceiving the CSRC in the IPO application can bring about severe punishment by the regulator, including a cancellation

of the IPO or even the firm's delisting.[14] For investment banks, leaving a bad impression with the regulator could jeopardize their future business. After having received the IPO application materials, the CSRC usually takes about six months to decide upon approving the firm's listing. Arguably, and in contrast to Western IPO markets, issuers and investment banks in China have fewer opportunities to time the market as regards the final listing date. Yet, this is not to say that such opportunities are nonexistent.[15] Besides, investment banks could try to boost investor enthusiasm for an issuer's stock and subsequently relate the offer price to (realized) investor overoptimism.

Since Dec. 31, 2004, IPO offer prices are to be determined after a bookbuilding exercise. After obtaining approval for listing, issuers, together with their investment banks, formally present the IPO candidate to potential investors. Specifically, they release a preliminary draft of the prospectus with an indicative price range and conduct a price inquiry among institutional investors. Relying on the tentative price quotations from institutional investors, issuers and their investment banks decide on the final offer price and on the number of shares offered; this process takes about two to three weeks. Once the offer price and the number of IPO shares have been publicly announced, investment banks start to accept subscriptions from institutional as well as retail investors; at this stage, all investors have to pre-pay the shares demanded. According to Circulation No. 37, imposed by the CSRC in 2006, at least 50% of IPO shares are to be sold to retail investors. However, issuers never reveal any details as to their plans to distribute shares among retail vs. institutional investors. Retail investors can sell their allocated IPO shares as of the first public trading day, while institutional investors face a 90-day lock-up period. Retail investors also play a major role in the secondary market. A report by the International Organization of Securities

[14] As of 2009, the CSRC has cancelled two IPOs because of the IPO application documents containing incorrect information as regards the issuer's earnings and related-party transactions.
[15] According to the SEC, it even takes about 10 to 15 weeks from the S-1 form filing to the final public offering in the U.S.A.

Commissions (IOSC) shows that retail investors held 83% of market capitalization and were responsible for 86% of trading volume in 2010.[16]

Article 127 of the Company Law, passed by the People's Council on Dec. 29, 2003, prohibits offer-price discrimination: "*The price of each share … shall be the same.*" Up till June 10, 2009, the IPO offer price has been capped by a fixed P/E ratio. Every year, this fixed P/E ratio cap was set by the CSRC and applied to all IPOs in that year. To attract the interest of the general public for IPOs, the CSRC deliberately set the P/E ratio cap considerably below the prevailing market P/E ratio (see also Gannon and Zhou, 2008; Francis *et al.*, 2009; Tian, 2011). After Dec. 31, 2004, with the publication of Circulation No. 162, this official P/E ratio cap was given up. Nonetheless, the CSRC continued to manage IPO offer prices to some extent up till June 10, 2009, relying on an implicit P/E ratio cap of 30 for most IPOs (Gao, 2010). On June 10, 2009, the CSRC publicly announced that it would no longer interfere in the pricing of IPO shares and henceforth left the fixing of offer prices to issuers, investment banks, and investors. So, it was only as of June 10, 2009 that offer prices became uniquely determined by a process of price inquiry. Since that date, the IPO offer price as well as the number of IPO shares can be set so as to account for market receptiveness to the offering.

Finally, investment banks in China can discretionally allocate the IPO shares to investors only since Jan. 1, 2014. In theory, allowing banks to decide freely on IPO allocation rules enables them to reward investors who revealed their favourable information about the issuer in the bookbuilding and, thus, can increase the efficiency of IPO pricing. Nonetheless, during our sample period, IPO shares had to be allocated pro rata, according to the amount of pre-payment made by primary-market investors. This applied to institutional investors as well as to retail investors. Besides, the maximum number of shares an individual investor could obtain cannot exceed 0.1% of the offering. The green-shoe mechanism – which can be included in IPOs since Dec. 31, 2004 – is only scarcely used; in our sample, it was even never embraced. As compensation for their services,

[16] For comparison, as revealed in this same report, retail investors in the U.S.A. only held 36.2% of market capitalization and were responsible for 2% of total trading volume in 2010.

investment banks charge a fee that is proportional to gross IPO proceeds. This fee provides compensation for underwriting and sponsoring services, including marketing efforts. With the implementation of 'The interim measures for stock issuance and listing recommendation' on March 1, 2004, investment banks became free to negotiate their fees with issuers. This negotiation usually takes place about six months before the IPO, when issuers sign an underwriting contract with their investment bank(s).

2.3. Over-issuance

2.3.1. Over-issuance

For each of the 607 firms becoming listed on a stock exchange in Mainland China between Jan. 1, 2010 and Dec. 31, 2011, we hand-collected the IPO application documents to compute its over-issuance.[17] After excluding the IPOs of financial institutions, whose capital raised is largely determined by regulatory considerations,[18] we could calculate over-issuance for 587 IPO firms. The offer price and other IPO-related information were collected from the CSMAR Chinese A-share IPO research database, while the accounting data were obtained from the CSMAR Chinese A-share financial reports database. Finally, we downloaded the stock price data from Datastream.

We define *over-issuance* as the ratio of net proceeds raised in the IPO to total capital required for the firm's prospective investment projects. Net proceeds are gross IPO proceeds from which we deduct investment-bank fees, auditing fees, lawyer fees, and any other IPO expenses. Those net proceeds can then be utilized to finance investment outlays after the firm's first listing. Table 2.1, Panel A reveals that the average over-issuance equals 2.55 in our sample (median of 2.36). In other words, about 60% of finance raised by the average IPO firm was without corresponding investment projects. In total, RMB 582 billion of capital was raised, while capital

[17] As of June 10, 2009, IPO offer prices are fixed based upon the results of a bookbuilding exercise. We start our sample period only as of Jan. 1, 2010, as it typically takes about six months for a firm to finalize the IPO application procedure. The IPOs in the second half of 2009 may therefore still have been approved under the old system. As we need at least two years of post-IPO financial information, we stop our sample period on Dec. 31, 2011.

[18] Not surprisingly, the amount of planned investments is not specified in their IPO application documents.

required equaled only RMB 283 billion. So, RMB 299 billion of capital was raised without corresponding investment projects. In only 25 IPOs (4.2% of the sample) is over-issuance smaller than one. Next, we split our sample into state-owned enterprises (SOEs) and private-controlled firms, depending upon the identity of the firm's controlling shareholder before the IPO.[19] Panel B shows that over-issuance emerges in both subsamples. It is slightly higher for the private-controlled firms, yet not significantly so (neither under a *t*-test nor under a Wilcoxon rank-sum test). Finally, Panel C reveals that the 55 IPOs in Shanghai are associated with an average over-issuance of 2.02 (median of 1.75), which is significantly smaller than the average over-issuance of 2.60 (median of 2.44) for the 532 firms becoming listed in Shenzhen.

Figure 2.1 shows the average and median over-issuance month by month over our sample period. It also shows a monthly market P/E ratio, obtained from weighing the Shanghai and Shenzhen P/E ratio by their corresponding market capitalization at month-end. Arguably, over-issuance seems to follow the pace of stock market valuation. To further substantiate this claim, we calculate the correlation of the monthly average over-issuance with the market P/E ratio at the end of the previous month. It equals 0.53 (*p*-value <0.001).

[19] We follow the definition of SOEs/private-controlled firms used by the CSRC database. In that database, both direct and indirect ownership by the state are taken into account. For example, if the state directly owns 30% of a firm, while another state-owned company owns 21% of it, this firm will be classified as an SOE, given that state ownership equals 51%.

Table 2.1
Summary statistics on over-issuance

In this table, we show summary statistics on over-issuance from January 1, 2010 to December 31, 2011. *Over-issuance* is obtained by dividing the net proceeds raised in every IPO by the capital required for the firm's investment projects, as stated in its IPO application documents. *Net IPO proceeds* are gross IPO proceeds from which we deduct investment-bank fees, auditing fees, lawyer fees, and any other IPO expenses. In Panel A, we show summary statistics on over-issuance by year. In Panel B, we show summary statistics for state-owned enterprises (SOEs) and private-controlled firms. We use a 50% pre-IPO ownership cutoff to identify SOEs and private-controlled firms. Thereby, we account for each owner's direct and indirect stake in the firm. In Panel C, we report summary statistics for IPOs in Shanghai vs. Shenzhen.

Panel A

Year	Obs.	Total net proceeds (billion RMB)	Total capital required (billion RMB)	Over-issuance (mean)	Over-issuance (median)	Over-issuance (minimum)	Over-issuance (maximum)	Number of IPOs with over-issuance≤1
2010	337	355	157	2.80	2.61	0.36	11.69	7
2011	250	227	126	2.21	2.06	0.60	5.49	18
2010—2011	587	582	283	2.55	2.36	0.36	11.69	25

Panel B

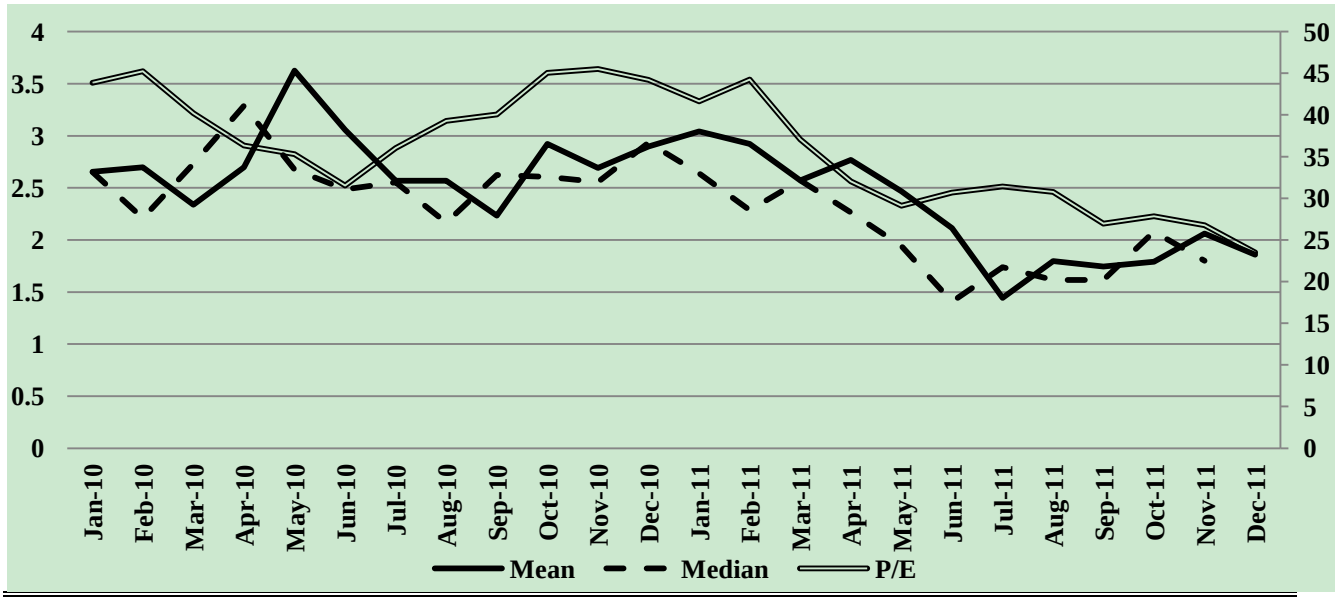
Firm type	Obs.	Total net proceeds (billion RMB)	Total capital required (billion RMB)	Over-issuance (mean)	Over-issuance (median)	Over-issuance (minimum)	Over-issuance (maximum)	Number of IPOs with over-issuance≤1
SOEs	81	141	89	2.39	2.24	0.36	11.69	10
Private firms	506	441	194	2.57	2.39	0.62	8.41	15

Panel C

Market	Obs.	Total net proceeds (billion RMB)	Total capital required (billion RMB)	Over-issuance (mean)	Over-issuance (median)	Over-issuance (minimum)	Over-issuance (maximum)	Number of IPOs with over-issuance≤1
Shanghai	55	153	97.6	2.02	1.75	0.36	11.69	5
Shenzhen	532	429	185.4	2.60	2.44	0.60	5.53	20

Figure 2.1.
Monthly over-issuance

In this figure, we show the average and median over-issuance for IPO firms listing in each of the months between January 1, 2010 and December 31, 2011. Over-issuance is calculated by dividing the net proceeds raised in the IPO by the total capital required for the firm's investment projects. We also show the corresponding monthly market P/E ratio. The market P/E ratio is a weighted average of the month-end P/E ratios in Shanghai and Shenzhen, using the market capitalization in each market as weighting factor. The market P/E is shown on the right-hand-side vertical axis of the chart.



2.3.2. Is the over-issued capital really excessive?

Over-issuance presents nothing but the ratio of capital actually raised in the IPO relative to the amount of capital needed for planned investment projects. One can imagine numerous reasons why over-issued capital may not really be *excessive* capital. For example, one might argue that issuers intentionally limit information on their investment projects in the IPO application documents to prevent competitors from learning about the firm's strategic choices. Although understating projects could be a dangerous deception of the regulator, we cannot rule out this possibility at this stage. Alternatively, during the price-inquiry process, investors reveal their private information about the issuer (Benveniste and Spindt, 1989). When this news is good, issuers may realize that more valuable investment opportunities exist than the ones they had identified at their (higher) estimate of the firm's cost of capital. They could then raise more finance than initially planned to start those extra projects. In a similar vein, they could collect more funds at the IPO when macro-

economic conditions improved since IPO application. Third, corporate finance theories point out that firms have an optimal capital structure (Modigliani and Miller, 1963; DeAngelo and Masulis, 1980; Bradley *et al*., 1984). When their debt ratio is too high, firms could also use the extra capital to pay down outstanding loans after their IPO (e.g., Pagano *et al.*, 1998).

To examine whether or not the over-issued capital is really excessive, we need to explore how it is used once the firm has become listed. If the over-issued capital is not excessive, it should correlate positively with either capital expenditures or debt repayment after the IPO; it should not be kept in the firm's cash account for a sufficiently long period after listing. Conversely, if the over-issued capital is really excessive, it should not correlate positively with either capital expenditures or debt repayment. Rather, it might positively influence the firm's post-IPO cash holdings.

We follow the methodology developed by Kim and Weisbach (2008) to examine the post-IPO usage of over-issued capital. First, we calculate *Total sources of funds* for each firm in its IPO year (Y_0) and in the two years thereafter (Y_1, Y_2). *Total sources of funds* is the sum of the net cash inflow from operations, the cash inflow from disposing investments and other fixed assets, the cash inflow from raising bank loans and from issuing bonds and seasoned equity. We split this *Total sources of funds* into three parts: *Planned investments*, which is obtained from the IPO application documents; *Over-issued capital*, which is the net IPO proceeds minus the planned investment amount; *Other sources of funds*, which is *Total sources of funds* minus net IPO proceeds. We then add up the cash outflow on capital expenditures in Y_0, Y_1 and Y_2 to obtain *Capital expenditures*.[20] Likewise, we also combine the debt repayment in Y_0, Y_1 and Y_2 to obtain *Debt repayment*.[21] Finally, we subtract the cash and cash equivalents number at the end of year Y_{-1} from that at the end

[20] Like Kim and Weisbach (2008), we include acquisitions in our main measure of *Capital expenditures*. Nonetheless, all results continue to hold when acquisition outlays are removed from *Capital expenditures*.

[21] Kim and Weisbach (2008) only include the repayment of long-term debt in their definition of *Debt repayment*. Unfortunately, the cash flow statement of Chinese listed firms makes no distinction between short-term loans and long-term loans. However, from a conceptual point of view, it might even be better to include the repayment of short-term debt in our definition of *Debt repayment*, particularly as long-term finance is only scarcely available in developing countries. Moreover, firms may find it much easier to repay their short-term loans in order to quickly adjust their capital structure.

of year Y_2 to obtain the *Change in cash holdings*. Following Kim and Weisbach (2008), we normalize all variables by the issuer's total assets at the end of year Y_{-1}. Table 2.2 presents summary statistics on those variables.

Table 2.2

Summary statistics on the variables used in the 'usage of over-issued capital' regressions

In this table, we show summary statistics on the variables used in the 'usage of over-issued capital' regressions in Table 2.3. The IPO firms included in the sample became listed between January 1, 2010 and December 31, 2011. Financial institutions are excluded from the sample. *Planned investments* is the total planned investment amount, as shown in the firm's IPO application documents. *Over-issued capital* is the amount of net proceeds raised in the IPO minus *Planned investments*. *Other sources of funds* is the total sources of funds the firm obtains in the IPO year and in the two years thereafter minus the net proceeds raised in the IPO. The total sources of funds is the sum of the net cash inflows from operations plus the cash inflow from disposing investments and other fixed assets plus the cash inflow from bank loans, bonds issuance, and seasoned equity offerings. *Capital expenditures* is the sum of capital expenditures (including acquisitions) in the IPO year and in the two years thereafter. *Debt repayment* is the sum of debt repayments in the IPO year and in the two years thereafter. *Change in cash holdings* is the cash and cash equivalents at the end of the second year after IPO minus the cash and cash equivalents at the end of the year before IPO. All variables are scaled by total assets in the year before IPO. *Capex ratio* is the ratio of *Capital expenditures* to *Planned investments* for each IPO firm.

Variable	Obs.	Mean	Median	Standard deviation	Min.	25%	75%	Max.
Planned investments	562	0.589	0.518	0.371	0.021	0.302	1.130	3.775
Over-issued capital	562	0.832	0.621	0.794	-0.392	0.351	0.754	5.019
Other sources of funds	562	1.125	0.783	1.138	0.010	0.367	1.391	11.029
Capital expenditures	562	0.648	0.523	0.521	-0.006	0.311	0.855	5.334
Debt repayment	562	0.707	0.457	0.736	0	0.168	1.037	4.398
Change in cash holdings	562	0.801	0.518	0.979	-0.519	0.175	1.097	6.690
Capex ratio	562	1.303	0.988	1.142	0.010	0.621	1.570	8.926

Next, we run regressions to explain *Capital expenditures*, *Debt repayment*, and *Change in cash holdings*. In those regressions, we control for firm size, measured by the log of total assets at the end of year Y_{-1}. Besides, we include an SOE dummy that equals one if the state – directly or indirectly – controls more than 50% of the firm's stock at IPO-time (12.8% of sample firms). We further include a market dummy that equals one if the firm lists in Shanghai. Finally, we add industry dummies, relying on the CSRC industry classification, and a dummy for the year 2011. Like Kim and Weisbach (2008), we use equation-by-equation regressions to estimate the various models. Our tests on the usage of over-issued capital thus look as follows:

$$Y = \alpha + \beta_1 \left[\frac{\text{Planned investments}}{\text{Total assets}_{-1}} \right] + \beta_2 \left[\frac{\text{Over-issued capital}}{\text{Total assets}_{-1}} \right] + \beta_3 \left[\frac{\text{Other sources of funds}}{\text{Total assets}_{-1}} \right]$$
$$+ \beta_4 \ln[\text{Total assets}_{-1}] + \beta_5 \text{SOE\_dummy} + \beta_6 \text{Market\_dummy} + \sum_{i=1}^{12} \lambda_i \text{Industry\_dummy} + \beta_7 \text{Year\_dummy}_{2011} + \varepsilon$$

where

$Y = [\sum_{i=0}^{2} V_i$ / Total assets$_{-1}$] for V= Capital expenditures, Debt repayment

$= [(V_2 - V_{-1})$ / Total assets$_{-1}$] for V= Cash and cash equivalents

One concern with this test is that investment projects may consist of various phases. Kim and Weisbach (2008) remedy this problem by using data for two and five years after the IPO.[22] As the most recent cash flow statements for our sample firms end in 2013, we can only follow issuers up to their second post-IPO year. Arguably, if planned investments have not been fully realized yet by that time, over-issued capital may bear no relation with capital expenditures. To deal with this concern, we first calculate the ratio of actual investments over our two-year window to planned investments. This *Capex ratio* averages 1.30 (median of 0.99). 49% of issuers have thus spent less than their planned investment amount by the end of year Y_2. Then, in addition to running the regressions for the full sample, we also estimate the models for the IPO firms with a *Capex ratio* > 1. This subsample analysis only includes the data on the 278 firms that have completed their planned investment program two years after the IPO. If over-issued capital remains uncorrelated with capital expenditures in this subsample, we can safely conclude that over-issued capital corresponds to no real investment opportunities and, hence, is really excessive. Table 2.3 reports the results for both the full-sample and the subsample analyses.

First, we find no significant association between *Over-issued capital* and *Capital expenditures*, neither in the full sample nor in the subsample. Correspondingly, the over-issued capital is not used for extra investments after the IPO. This finding thus allows to refute the idea that firms deliberately limit the disclosure of initially planned investments in their IPO application documents. Likewise, we can rule out that firms collect a larger amount of finance at their actual

[22] However, they find that their results do not depend upon the post-IPO window being used.

listing date because they have learnt since their IPO application that more projects have a positive NPV.[23] Next, we do find a significant positive association between *Planned investments* and *Capital expenditures*, which is not surprising as the finance raised at IPO is supposed to be spent on real investment projects. However, the relation between *Planned investments* and *Capital expenditures* is far smaller than one in the full sample regression. The coefficient on *Planned investments* indeed equals only 0.17. Interestingly, it rises to 0.82 in the subsample regression. Together, the above results indicate that investment progress may have been rather slow on average. In line with this inference, Table 2.2 already revealed that about half of the firms didn't carry out all investments they had planned by the end of their second post-IPO year.

[23] We can also repudiate the idea that improved macro-economic conditions since IPO application incite firms to raise more finance at their IPO. In a more direct test of the role of macro-economic conditions, we calculated the correlation between provincial GDP growth in the IPO years (i.e. year 2010 and year 2011) and the over-issuance of IPO firms in that province. For the firms that operate nationally, we use the Chinese national GDP growth rates. We find that the correlation is only 0.05 and not significant (*p*-value of 0.274).

Table 2.3
The usage of over-issued capital after IPO

This table reports the OLS regressions results as to the usage of over-issued capital after the IPO. The dependent variables are *Capital expenditures*, *Debt repayment*, and *Change in cash holdings*, respectively. *Capital expenditures* is the sum of capital expenditures (including acquisitions) in the IPO year and in the two years thereafter. *Debt repayment* is the sum of debt repayments in the IPO year and in the two years thereafter. *Change in cash holdings* is the cash and cash equivalents at the end of the second year after IPO minus the cash and cash equivalents at the end of the year before IPO. The research variables include *Over-issued capital*, *Planned investments*, and *Other sources of funds*. *Over-issued capital* is the amount of net proceeds raised in the IPO minus *Planned investments*. *Planned investments* is the total planned investment amount as shown in the firm's IPO application documents. *Other sources of funds* is the total sources of funds the firm obtains in the IPO year and in the two years thereafter minus the net proceeds raised in the IPO. The total sources of funds is the sum of the net cash inflows from operations plus the cash inflow from disposing investments and other fixed assets plus the cash inflow from bank loans, bonds issuance, and seasoned equity offerings. We further include the log of total assets by the end of the year before IPO. *SOE dummy* equals one if the Chinese state controls more than 50% of the firm's voting rights before IPO. *Market dummy* equals one if the firm lists on the Shanghai stock exchange. Finally, we account for industry and year fixed effects by means of industry dummies (CSCR industry classification) and a year dummy for 2011. The full-sample regressions are run on the IPO firms listed between January 1, 2010 and December 31, 2011. The subsample regressions are run on the firms with Capital expenditures/Planned investments ≥ 1. *p*-values are reported between parentheses. Coefficients significant at the 10%, 5%, and 1% level are marked with *, **, and ***, respectively.

	Full sample			**Subsample**		
	Capital expenditures	**Debt repayment**	**Change in cash holdings**	**Capital expenditures**	**Debt repayment**	**Change in cash holdings**
Intercept	3.297***	0.205	-1.611**	1.809**	1.096	-0.299
	(<0.001)	(0.800)	(0.031)	(0.049)	(0.377)	(0.788)
Over-issued capital	-0.015	-0.276***	0.869***	0.060	-0.267***	0.776***
	(0.580)	(<0.001)	(<0.001)	(0.205)	(0.002)	(<0.001)
Planned investments	0.165***	-0.300***	0.694***	0.822***	-0.441**	0.044
	(0.010)	(0.001)	(<0.001)	(0.003)	(0.022)	(0.790)
Other sources of funds	0.165***	0.312***	0.110***	0.237***	0.419***	0.168***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Ln(Total assets$_{-1}$)	-0.121***	0.022	0.043	-0.067*	-0.036	-0.007
	(<0.001)	(0.562)	(0.210)	(0.100)	(0.529)	(0.898)
SEO dummy	-0.104*	-0.200***	0.142**	-0.092	-0.170	0.100
	(0.081)	(0.010)	(0.041)	(0.261)	(0.149)	(0.312)
Market dummy	0.048	-0.094	-0.038	0.022	0.137	-0.111
	(0.554)	(0.366)	(0.697)	(0.834)	(0.360)	(0.399)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.35	0.46	0.74	0.59	0.59	0.62
Number of observations	563	563	562	279	279	278

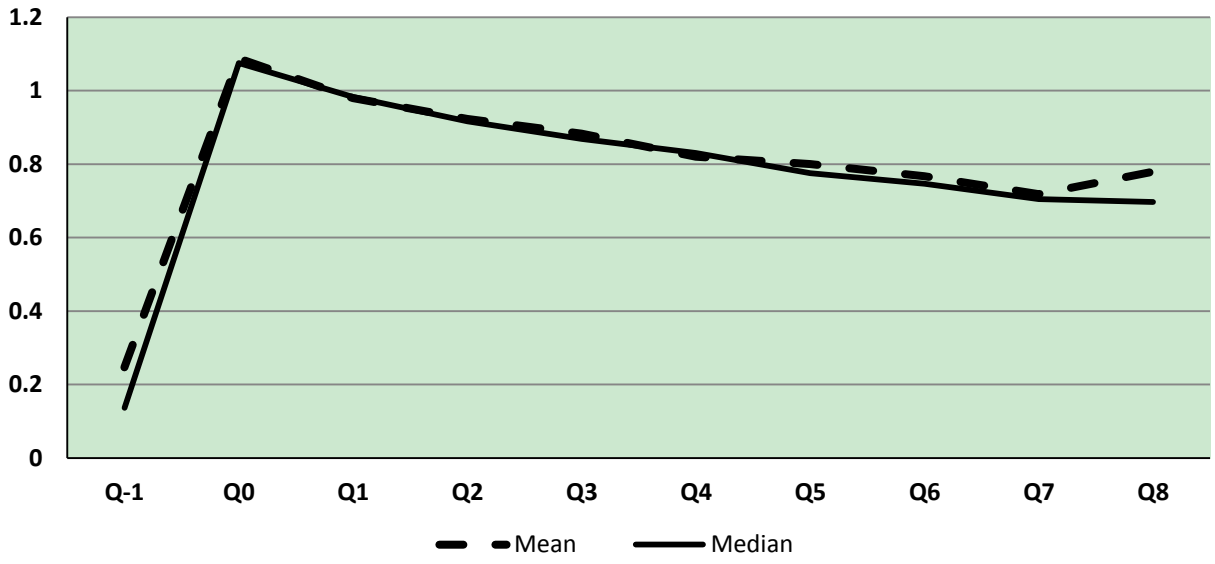
Next, the results from the debt-repayment regressions are also quite comparable across the full sample and the subsample. They show that the over-issued capital is not used to retire the

outstanding debt either. On the contrary, the coefficient on *Over-issued capital* is significantly negative, thereby indicating that higher over-issuance is associated with a smaller debt repayment in the first two years after listing. We notice that the coefficient on *Planned investments* is negative, too. We thus infer that the more capital is raised in the IPO, the smaller is the debt repayment. This result complies with what Kim and Weisbach (2008) find, although they did not split IPO proceeds into planned investments and over-issued capital.

Finally, the regressions explaining the *Change in cash holdings* indicate that the IPO firms transfer the excessive capital to their cash and cash equivalents account. Even among the firms that invested more than their planned investment amount (the subsample regression), a one Yuan increase in over-issued capital engenders a 87 cents increase in cash holdings by the end of the second post-IPO year. Over-issuance thus results in extra cash holdings. To further examine the latter outcome, we trace the cash and cash equivalents of the IPO firms after their stock market introduction. We scale a firm's cash holdings from one quarter before the IPO to the 8^{th} post-IPO quarter by its net IPO proceeds. Figure 2.2 shows the results. Two years after listing, the cash and cash equivalents held by the average issuer still represent 78% of funds raised at IPO-time (median of 70%). This finding thus once more reveals that a large part of net IPO proceeds remains stored in the cash account.

Figure 2.2.
Cash and cash equivalents before and after IPO

In this figure, we show the average and median of cash and cash equivalents held by the IPO firms listing between January 1, 2010 and December 31, 2011, over a period from one quarter before the IPO (Q-1) to the 8th post-IPO quarter (Q8). For every IPO firm at the end of every quarter, we scale its cash and cash equivalents by its net IPO proceeds. We subsequently calculate the average and median of this variable across all IPO firms.



We subsequently compare the cash-to-total-assets ratio of the IPO firms at the end of their second post-IPO year with the average for all listed firms in the corresponding industry. As the IPO firms became listed in the year 2010 or 2011, the end of their second post-IPO year is either 2012 or 2013. So, the corresponding cash-to-total-assets ratios of established industry peers are calculated using the 2012 or 2013 annual reports. Table 2.4 reports the results, emphasizing once more that the cash holdings of the IPO firms remain exceptionally high two years after listing. Indeed, the average cash ratio is 29% for the IPO firms (median of 25%), while the average for all listed firms is a much smaller 18% (median of 15%). In all industries, the cash ratio of IPO firms is significantly larger than the industry average, based upon a *t*-test as well as a non-parametric Wilcoxon rank-sum test.

Considering the above empirical evidence, we can safely conclude that the over-issued capital is indeed excessive, corresponding to no real investment projects.

Table 2.4
Summary statistics on the cash-to-total-assets ratio

In this table, we show summary statistics on the cash-to-total-assets ratio by the end of the second post-IPO year for the firms listed in 2010 and 2011 and the corresponding industry mean and median for already-listed firms. The industry classification is according to the CSRC standard industry classification. We calculate the cash-to-total-assets ratio at the end of the second year after IPO for the firms listed from Jan. 2010 to Dec. 2011. We compare the mean and median of these cash-to-total-assets ratios with their industry means using annual financial reports of the firms in the same industry in 2012 to 2013. We perform a *t*-test for mean equality and a non-paramteric Wilcoxon rank-sum test for median equality. We also report the *p*-value of these tests.

Industry	**Firm category**	**Number of IPO firms**	**Mean**	**Median**	***p*-value of *t*-test**	***p*-value of Wilcoxon test**
Agriculture, forestry, livestock farming, fishery	IPO firms	11	26%	25%	0.042	0.003
	All listed firms		16%	12%		
Mining	IPO firms	9	30%	32%	0.001	<0.001
	All listed firms		15%	14%		
Manufacturing	IPO firms	425	28%	24%	0.001	<0.001
	All listed firms		17%	15%		
Utilities	IPO firms	3	25%	23%	0.002	0.017
	All listed firms		11%	7%		
Construction	IPO firms	12	24%	24%	0.067	0.009
	All listed firms		18%	14%		
Wholesale and retail	IPO firms	5	32%	32%	0.070	0.027
	All listed firms		19%	15%		
Transportation	IPO firms	66	43%	32%	<0.001	<0.001
	All listed firms		26%	22%		
Hotel and catering	IPO firms	13	32%	28%	0.057	0.052
	All listed firms		23%	20%		
Real estate	IPO firms	14	30%	25%	<0.001	<0.001
	All listed firms		21%	17%		
Leasing and commercial service	IPO firms	11	38%	42%	0.005	0.002
	All listed firms		25%	29%		
Scientific research and technology service	IPO firms	2	32%	32%	0.010	0.040
	All listed firms		16%	15%		
Overall	**IPO firms**	**571**	**29%**	**25%**	**<0.001**	**<0.001**
	All listed firms		**18%**	**15%**		

2.4. An explanation for over-issuance

2.4.1. Exploring the theoretical literature and propose an explanation

The over-issuance phenomenon is hard to reconcile with traditional corporate finance theories based on rational agents and (semi-strong) efficient markets. Under the rational-agents and efficient-markets framework, an IPO is costly because of the fees to be paid to investment banks and IPO underpricing. The literature has explained investment-bank fees as either a certification cost (Booth and Smith, 1986) or a compensation for the risk that underwriters will have to buy any unsold IPO shares in a firm-commitment offering (Bae and Levy, 1990). Besides, the literature has put forward a number of explanations for why IPO shares should be priced below their intrinsic value, i.e. IPO underpricing.[24] Ritter (2012) estimates that over the last decade the average issuer in the U.S.A. gave up 18 cents for every dollar raised, including investment-bank fees and the first-day abnormal return. In China, the average investment-bank fee rate as of Jan. 1, 2010 equaled 5.2% of gross IPO proceeds, while the average first-day abnormal return amounted to 33%. So, for every Yuan raised, issuers actually gave up 38.2 cents to either investment banks or primary-market investors.[25] With such a huge issuing cost, one would expect issuers to avoid raising excessive capital at IPO-time, i.e. no over-issuance (Habib and Ljungqvist, 2001). However, we observe quite the opposite in the Chinese domestic IPO market.[26]

Another strand of the literature raises questions about whether IPOs really provoke a cost to issuers. The reason is that stock market investors are not always rational and, hence, they may misprice securities from time to time (Miller, 1977; Daniel *et al.*, 2001). This irrationality or

[24] Those theories include but are not limited to the winner's curse theory by Rock (1986), the signaling theory by Welch (1989), the litigation theory by Tinic (1988), the bookbuilding theory by Benveniste and Spindt (1989). For a good review, see Ritter and Welch (2002).

[25]The other costs in Chinese IPOs contain audit costs, lawyer cost, registration costs &etc. Comparing to underwriting fee and underpricing, total other costs only contributes about 3% of total issuing costs in our sample firms. Among the 3% of other costs, 80% also (partly) increases with issue amount, such as audit fee. So, we do not think fixed cost is a major concern in determining IPO amount.. .

[26] A limited post-IPO access to the stock market seems unlikely to explain the phenomenon of over-issuance. Indeed, listed firms can implement a seasoned equity offering in Chinese domestic stock markets as long as they have three consecutive years of positive pre-SEO earnings. In our sample, over 95% of firms fulfil this requirement. Besides, among the 2,392 firms becoming listed in Chinese domestic stock markets till the end of 2011, 546 (23%) made a seasoned equity offering within three years after their IPO. This percentage is quite comparable to that in the U.S. market. Krigman *et al*. (2001) find that 28% of the firms becoming listed in the U.S.A. between 1993 and 1995 made a SEO in the three years as of listing.

limited rationality on the part of the investors arises from certain psychological aspects of human behavior, such as overweighting one's own information and overconfidence in one's own expertise. We consider those theories as potentially highly relevant in the Chinese context, where small retail investors account for a major fraction of trading volume. Compared to institutional investors, retail investors are more prone to irrational behavior (De Bondt, 1998). Hence, issuers and their investment banks could actively time the market by selling overvalued shares to exploit those overly optimistic investors. From a survey, Graham and Harvey (2001) conclude that two-thirds of CFOs of Fortune 500 companies agreed that the magnitude by which their stock was over-/under-valued was an important or very important consideration in deciding on when to issue shares. Likewise, Pagano *et al.* (1998) note that firms in Italy are more likely to go public when the price-to-book ratio in their industry peaks. They suggest that investors could be overly optimistic about certain sectors, while issuers may exploit that sectoral mispricing. So, if issuers – together with their investment banks – are able to correctly time the IPO market, they can increase the wealth of the firm's pre-IPO owners by selling overpriced shares at the IPO. Likewise, Baker and Wurgler (2002) argue that market timing benefits ongoing shareholders at the expense of entering and exiting ones. Hence, IPO firms may have no reason to limit the offer size by their firm's investment needs. Instead, they may sell as many overpriced shares as possible. In China, the maximum number of shares that can be sold at the IPO is approved by the CSRC and is set before bookbuilding starts. Yet, since June 10, 2009, firms also obtained full discretion in fixing the offer price. Hereafter, we further develop the 'investor-exploitation explanation' of over-issuance, based on behavioral finance theory.

2.4.2. Testable hypotheses

2.4.2.1. Stock returns in the aftermarket

If the investor-exploitation explanation is true, IPO stock should be sold at a price above its intrinsic value. Daniel *et al.* (1998) propose a theory explaining why stocks could be overvalued by

investors and how that overvaluation might influence subsequent short-term and long-term stock performance. The theory is built on two premises, both derived from psychological research on human behavior. First, investors are sometimes overconfident about their ability to evaluate a stock. Second, this overconfidence is strengthened when the outcome – i.e. the observed stock price – confirms their expectations, i.e. a self-attribution effect arises. Typically, the investors who buy the IPO stock in the primary market are the ones who are highly optimistic about the issuer's prospects. Because of overconfidence, those highly optimistic investors tend to overestimate the precision of their (good) private information about the firm. They may therefore put too much weight on their own (good) information when evaluating the issuer. When the firm's stock price subsequently goes up in the aftermarket, they become even more confident about their valuation ability because of the self-attribution effect. Hence, they further overweigh their own (good) information, which generates an even higher stock price. When the stock market is dominated by such overly optimistic investors, the issuer's share price will be pushed even higher in a short period after the IPO, i.e. short-term overshooting creating upwards momentum. However, as time passes by, the firm's true value eventually becomes known in the aftermarket and the stock price will drop, resulting in long-term underperformance. In sum, the theory implies that the IPO stocks that are bought mostly by overoptimistic investors will perform well shortly after the IPO, but will perform poorly in the long run. Purnanandam and Swaminathan (2004) empirically examine this idea. They measure the overvaluation of IPO firms by comparing each firm's financial multiples (price-to-sales, price-to-EBITDA, and price-to-earnings) to those of their already-listed industry peers in U.S. IPOs between 1980 and 1997. They conclude that the median IPO firm is overvalued at the offer by 14% to 50% relative to its industry peers. Next, the stocks that were most highly overvalued at IPO-time outperformed the other IPO stocks in the first six months after flotation; however, those stocks started to underperform as of the end of the sixth post-IPO month up till five years after listing.

In the context of our study, over-issuance is the multiple of the capital firms actually raised in their IPO relative to the amount required for their planned investment projects. Under the investor-exploitation explanation, over-issuance increases with investor over-optimism and thus correlates positively with stock overvaluation. In this way, we should be able to use over-issuance as a proxy for stock over-valuation at the time of the IPO. If the investor-exploitation explanation is true, we should be able to form investment portfolios with long–short positions in stocks with different levels of over-issuance to realize an abnormal return over a short as well as a long time interval after the IPO. So, we put forward the following hypothesis:

> *H1: If the investor-exploitation explanation is true, we can form long–short investment portfolios based on over-issuance to realize an abnormal return in the short run as well as in the long run.*

On the other hand, if agents are rational and markets efficient, all information about the issuer should be incorporated into the stock price at the time of first listing. As over-issuance is public information in the aftermarket, no abnormal return should be realizable from portfolios built on over-issuance. [27]

2.4.2.2. The relation between over-issuance, fee rates, and first-day abnormal returns

Investment banks are repetitive players in the IPO market; they are also active players in the secondary market, through their securities investments and brokerage business. Those activities offer investment banks a natural advantage in assessing investor sentiment in the stock market. So, if the investor-exploitation explanation is true, investment banks could help issuers to spot the transitory windows of opportunity and to market the IPO shares at an attractive price (Loughran and Ritter, 1995). In the Chinese case, this timing advantage may relate somewhat less to the actual

[27] We need to caution readers that *H1* suggest that investor-exploitation leads to **both** short-term over performance **and** long-term under performance of highly over-issued firms. Under efficient market and rational agent assumption, the aftermarket stock price of highly over-issued firms can underperform in the long run due to their higher cash holding and lower required return. However, in efficient market, higher cash holding should not lead to higher short-term aftermarket performance of these firms. So, we argue that the only explanation to **both** short-term over performance **and** long-term performance is investor-exploitation.

moment of flotation, as the CSRC largely determines the actual listing date, but definitely will influence the pricing of IPO stock (and, thus, over-issuance). Investment banks indeed play a crucial role in marketing the offering and in sustaining the firm's valuation among investors at IPO-time, especially in a market that is still dominated by retail investors. To encourage investment banks to play this role, issuers may agree to a larger fee rate when investment banks are able to raise a larger amount of capital for a given number of shares offered. As revealed by the largest financial newspaper in China, the China Securities Times, there is evidence that issuers actually include an over-issuance clause in their underwriting contract with investment banks. A larger fee rate increases the marginal benefit realized by investment banks on every additional Yuan raised and, thus, encourages a higher offer price through a better marketing of the IPO. So, we expect that a larger investment-bank fee rate will bring about more over-issuance. Conversely, higher over-issuance also implies that issuers and their investment banks take a bigger advantage of the overly optimistic investors in the primary market. This could impose a reputation cost on investment banks, for which they may demand compensation by means of a larger fee rate. Moreover, as the number of IPO shares is constrained by the CSRC-approved volume, the only way to enhance over-issuance is to increase the IPO offer price. However, a larger offer price also increases the likelihood of insufficient investor demand for IPO shares and, thus, the odds that underwriters may have to buy any unsold IPO shares. Investment banks may therefore also have other reasons to ask for a larger fee rate as over-issuance increases. In sum, we expect over-issuance to positively influence the investment-bank fee rate as well. Taken together, our arguments imply that over-issuance and the fee rate are endogenous under the investor-exploitation explanation; they positively influence each other. Those ideas result in the following hypothesis:

> *H2: If the investor-exploitation explanation is true, over-issuance and the investment-bank fee rate are endogenous and positively related to each other.*

On the other hand, if agents are rational and markets efficient, over-issuance implies that issuers and their investment banks under-estimated firm value at the time of IPO application. The higher is

the over-issuance, the larger is this under-estimation. Issuers should (at least) not reward investment banks by their mistakes. So, over-issuance and fee rates should not be correlated in this case, *ceteris paribus*.

Under the investor-exploitation explanation, investment banks will price the IPO shares above their intrinsic value, but below the investors' valuation, i.e. below the maximum price that primary-market investors are willing to pay for the issuer's stock (Ljungqvist *et al.*, 2006). Investment banks thus leave a certain profit to primary-market investors, by allowing them to sell their IPO shares at a higher price to other overly optimistic investors in the aftermarket. This profit leaves a sweet taste in the mouth of primary-market investors, inciting them to also participate in future IPOs underwritten by this same investment bank. For retail investors, the first-day abnormal return can clearly capture this profit. For institutional investors, the offer price should definitely be set low enough compared to the maximum price that primary-market investors are willing to pay. Otherwise, they might not be able to sell their allocated IPO shares with a profit once their 90-day lock-up period expires. Besides, pricing the IPO shares below the maximum price that is achievable is a self-protection mechanism for underwriters in a firm-commitment offering. In such an IPO, when shares would have been issued at the maximum price, the likelihood that the investment bank has to buy any unsold IPO shares is much higher. Overall, when investment banks lower the offer price, the net proceeds from the IPO will be reduced as well and so will over-issuance. A higher level of IPO underpricing thus negatively affects over-issuance, everything else constant. Conversely, for a given level of investor overvaluation, if issuers and investment banks would like to enchance over-issuance, the only way they can do so is by lowering the IPO's underpricing. We therefore expect over-issuance and the first-day abnormal return to be endogenous and negatively related to each other. The above arguments result in the following hypothesis:

> *H3: If the investor-exploitation explanation is true, over-issuance and the first-day abnormal return are endogenous and negatively related to each other.*

On the other hand, under the rational-agents and efficient-markets framework, IPO underpricing is largely determined by the degree of asymmetric information between issuers and investors. Higher over-issuance then likely reflects that investors revealed more favorable information about the issuer in the process of price inquiry. To reward investors for their information revelation, issuers/investment banks could underprice the IPO to a larger extent (Benveniste and Spindt, 1989). This idea is likely to apply even more so in a market where investment banks cannot discretionally allocate IPO shares, like in China. So, if agents are rational and markets efficient, over-issuance should correlate positively with the first-day abnormal return, ceteris paribus.

2.5. Empirical results

In this section, we empirically examine the inferences made in Section 2.4. We use the data on all 587 IPOs for the analysis of the stock returns in the aftermarket. For the analysis of the relation among over-issuance, investment-bank fee rates, and first-day abnormal returns, we rely on a subsample of 559 IPOs for which all necessary accounting data are available.[28]

2.5.1. Stock returns in the aftermarket

First, we rely on over-issuance to construct an investment portfolio shortly after the firms' IPO (*the short-term portfolio*). Starting from D1, i.e. the 120th trading day (about half a year) after Jan. 1, 2010, we collect the data on all IPOs listed between 120 days before D1 and D1. So, on average, the issuers included in this portfolio have been listed for about 60 days. We subsequently take a long position in the stocks with over-issuance above the 75% percentile (reflecting high investor optimism at IPO-time) and a short position in the ones with over-issuance below the 25% percentile (reflecting low investor optimism at IPO-time). In this way, the portfolio is always a zero-investment portfolio. We rebalance this portfolio every 30 trading days. For example, when we

[28] We find that the average and median over-issuance, fee rate, first-day abnormal return of the firms used in the multivariate regression analyses are not significantly different from those removed from the sample.

reach the 150th trading day after Jan. 1, 2010 (D2), we repeat the portfolio formation procedure with the IPOs issued between 120 days before D2 and D2 and hold this portfolio for another 30 days. The last portfolio is formed at the 480th trading day after Jan. 1, 2010. Our sample indeed only includes IPOs up till Dec. 31, 2011. So, we obtain 390 daily portfolio returns in total.

Second, we again use over-issuance to construct another investment portfolio, long after the firms' IPO (*the long-term portfolio*). Starting from D1, which is now the 360th trading day (about 18 months) after Jan. 1, 2010, we collect the data on all IPOs listed between 360 days and 240 days before D1. In this way, the stocks included in this long-term portfolio have been listed for about 300 days. We now take a short position in the stocks with over-issuance above the 75% percentile and a long position in the ones with over-issuance below the 25% percentile. We again rebalance this portfolio every 30 trading days. The last portfolio is formed at the 720th trading day after Jan. 1, 2010. We again obtain 390 daily portfolio returns in total.

Table 2.5, Panel A reports summary statistics on the daily portfolio returns. The short-term portfolio has an average daily return of 0.08%, which is significantly different from zero. The cumulative return from this investment portfolio over 390 trading days amounts to 31.21%. The long-term portfolio has an average daily return of 0.07%, also statistically significant. The cumulative return over the 390-day window now equals 27.32%. We warn readers that those portfolio returns may vanish once transaction costs are taken into account. Importantly, we did not implement this test to develop an arbitrage strategy for investors. Rather, the purpose of our test was to examine an essential implication of the investor-exploitation explanation for the short-term and long-run performance of over-issued IPOs. The results reveal that investor over-valuation indeed existed and was exploitable.

In a robustness check, we use other windows to form investment portfolios. For the short-term portfolio, we employ two different time frames. One starts at the 160th trading day before D1, while the other starts at the 80th trading day before D1. For the long-term portfolio, one time frame starts at the 400th trading day before D1 and ends at the 240th day before D1; the other starts at the

320th trading day before D1 and ends at the 240th day before D1. Table 2.5, Panel B reports the results. They prove highly similar to those in Panel A, although the windows in Panel A seem to generate higher returns.

In another test, like Purnanandam and Swaminathan (2004), we rely on relative industry multiples to construct investment portfolios. More precisely, the latter scholars compare the multiples of IPO firms with those of their already-listed industry peers, called the P/V ratio. They find that the median issuer's P/E ratio, calculated at the offer price, is about 1.53 times that of its listed industry peers. We follow their methodology by dividing each issuer's P/E ratio by the industry average P/E ratio in the quarter preceding the IPO. Interestingly, the average P/V ratio in our sample is only 0.96 (median of 1.03), pointing out that Chinese IPOs are typically issued at a P/E ratio that is comparable to that of industry peers.[29] Arguably, investment banks in Chinese domestic IPOs seem to help identifying the overvalued industries and then advice potential issuers in those industries in their process of listing (see also Pagano *et al*., 1998). Possibly, industry overvaluation is more persistent than firm-specific overvaluation and thus more predictable, given the average six-months approval period for IPOs in China. Next, once the IPO shares are to be priced, investment banks do not (dare to) deviate too much from the average valuation in the issuer's industry, which allows them to hide in the crowd and avoid negative reputation effects. The P/V ratio may thus not provide a good indicator of stock over-valuation in the Chinese context (see also Kim and Ritter, 1999; Zheng, 2007). Nonetheless, we did construct investment portfolios relying on this P/V ratio. Table 2.5, Panel C reports the results. In line with the above arguments, we no longer find any evidence of significant portfolio returns, which indicates that over-issuance is a far better indicator of issuer overvaluation than the P/V ratio.

[29] Like Purnanandam and Swaminathan (2004), we also calculated this P/V ratio using the P/Sales and P/EBITDA multiple. The average P/V ratio using P/Sales is 0.87 (median of 0.94), while the average P/V ratio using P/EBITDA is 0.93 (median of 0.95). When relying on those P/V ratios to form investment portfolios, we obtain similar results as when using the P/V ratio from relying on the P/E ratio.

Table 2.5
Summary statistics on the daily portfolio returns

In this table, we present summary statistics on the daily portfolio returns for the *short-term portfolio* as well as the *long-term portfolio*. We also report the *p*-value of a *t*-test examining whether the daily portfolio returns are significantly different from zero. Finally, we report the cumulative return, measured over the total number of trading days in the portfolio formation period.

In Panel A, for the *short-term portfolio,* starting from the 120th trading day after Jan. 1, 2010 (D1), we collect the data on all IPOs listed between 120 days before D1 and D1. We subsequently take a long position in the stocks with over-issuance above the 75% percentile and a short position in the ones with over-issuance below the 25% percentile. We rebalance this portfolio every 30 trading days. The last portfolio is formed at the 480th trading day after Jan. 1, 2010. For the *long-term portfolio,* starting from the 360th trading day after Jan. 1, 2010 (D1), we collect the data on all IPOs listed between 360 days and 240 days before D1. We now take a short position in the stocks with over-issuance above the 75% percentile and a long position in the ones with over-issuance below the 25% percentile. We again rebalance this portfolio every 30 trading days. The last portfolio is formed at the 720th trading day after Jan. 1, 2010.

In Panel B, we use exactly the same portfolio formation method, but change the time windows. For the *short-term portfolio1*, we start from the 160th trading day after Jan. 1, 2010. For the *short-term portfolio2***,** we start from the 80th trading day after Jan. 1, 2010. For the *long-term portfolio1,* we start from the 400th trading day after Jan. 1, 2010. For the *long-term portfolio2***,** we start from the 320th trading day after Jan. 1, 2010.

In Panel C, we report the returns using exactly the same portfolio formation procedure and time window as in Panel A; the only difference is that we form investment porfolios based on relative industry multiples rather than on over-issuance (see also Purnanandam and Swaminathan, 2004). So, we divide each issuer's P/E ratio by the industry average P/E ratio in the quarter preceding the IPO and use this relative mutiple to form investment portfolios.

Panel A

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.	*t*-test H0: mean=0	Cumulative return
Short-term portfolio	390	0.0008	0.0007	0.0074	-0.0354	0.0250	0.040	31.21%
Long-term portfolio	390	0.0007	0.0001	0.0075	-0.0194	0.0255	0.052	27.32%

Panel B

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.	*t*-test H0: mean=0	Cumulative return
Short-term portfolio1	360	0.0006	0.0006	0.0062	-0.0151	0.0212	0.070	21.64%
Short-term portfolio2	450	0.0005	0.0005	0.0048	-0.0305	0.0190	0.081	22.51%
Long-term portfolio1	360	0.0007	0.0001	0.0063	-0.0251	0.0235	0.090	25.20%
Long-term portfolio2	450	0.0004	0.0002	0.0045	-0.0394	0.0210	0.120	18.01%

Panel C

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.	*t*-test H0: mean=0	Cumulative return
Short-term portfolio	390	0.0000	0.0001	0.0030	-0.0148	0.0191	0.921	0.01%
Long-term portfolio	390	0.0000	0.0000	0.0055	-0.0201	0.0212	0.726	0.00%

Table 2.6
Summary statistics on excess market returns, BMS and HML portfolio returns

In this table, we present summary statistics on the explanatory variables used in the short-term and the long-term investment portfolio daily return regressions. Excess market return is the daily CSI 300 index return minus the corresponding risk-free rate; BMS is calculated as the CSI 100 index daily return minus the CSI 500 index daily return; HML is calculated as the CSI value-firm index daily return minus the CSI growth-firm index daily return.

Panel A. Explanatory variables in the short-term investment portfolio return regression

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Excess market return	390	-0.0005	-0.0001	0.0136	-0.0622	0.0369
BMS	390	0.0003	-0.0003	0.0101	-0.0272	0.0429
HML	390	-0.00004	-0.0001	0.0054	-0.0104	0.0155

Panel B. Explanatory variables in the long-term investment portfolio return regression

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Excess market return	390	-0.0006	-0.0001	0.0136	-0.0358	0.0489
BMS	390	0.0004	0	0.0065	-0.0131	0.0348
HML	390	0.00003	-0.00002	0.0071	-0.0148	0.0158

Table 2.7
Short-term and long-term investment portfolio daily return regressions

We regress the daily returns from our short-term and long-term investment portfolios on their corresponding excess market returns, on the returns of a big-firm minus small-firm portfolio (BMS), on the returns of a high book-to-market minus low book-to-market portfolio (HML). *p*-values are reported between parentheses. They are all calculated against block bootstrapped errors, we take 5 lags as a block. Coefficients significant at the 10%, 5%, and 1% level are marked with *, **, and ***, respectively.

	Constant	Excess market return	BMS	HML	Adjusted R-square	*p*-value of wald chi-square	Sample size
Short-term portfolio	0.00065* (0.066)	-0.1403*** (<0.001)	0.0841 (0.261)	-0.5341*** (<0.001)	0.1165	<0.0001	390
Long-term portfolio	0.00065** (0.048)	0.0791*** (<0.001)	-0.0612 (0.299)	0.3221*** (0.005)	0.0620	0.0010	390

As one might argue that the positive returns in Panels A and B of Table 2.5 just reflect differences in systematic-risk exposure across the stocks that were bought/sold, we subsequently run Fama-French (1993) three-factor regression models on the daily returns from the two portfolio strategies.[30] That is, we regress the daily returns of each investment portfolio on the excess market return, on a big-minus-small portfolio return (BMS), and on a high book-to-market minus low

[30] In an unreported test, we also used CAPM benchmark, the results are similar to those of Fama-French regression. We also run the regressions separately with long and short portfolios, we obtain significant alphas in these regressions.

book-to-market portfolio return (HML). We use the one-year deposit rate published by the People's Bank of China as a proxy for the risk-free rate when calculating the market risk premium (see also Drew *et al.*, 2003; Wang and Di Iorio, 2007). Like those authors, we also use the CSI 300 index to calculate the market return, the CSI 100 big-firm index for the big-firm portfolio return, the CSI 500 small-firm index for the small-firm portfolio return, the CSI value-firm index for the high book-to-market portfolio return, and the CSI growth-firm index for the low book-to-market portfolio return.[31] All those stock indices are published by China Securities Index Ltd., which is jointly operated by the Shanghai and Shenzhen stock exchanges. Table 2.6 presents summary statistics on the excess market return, BMS, and HML. Table 2.7 shows the results from the Fama-French regressions. To address the concern that the daily portfolio returns may be serially correlated, we draw our conclusions from bootstrapped standard errors using block bootstrap[32].

Table 2.7 reveals that after controlling for the excess market return, BMS, and HML, the investment strategies generate a positive alpha for the short-term as well as the long-term portfolio, i.e. a significantly positive intercept of 0.00065. This number corresponds to an abnormal return (before deducting any transaction costs) of about 14% per annum. We further note that the excess market return and HML significantly influence the daily portfolio returns, yet with an opposite sign across the short-term and long-term portfolios. This outcome reflects the differences in short and long positions in IPO stock, based on over-issuance. Overall, in line with Daniel *et al.* (1998), our findings imply that highly over-issued IPOs outperform in the short run, but underperform in the long run. The significant return from the long-term investment strategy is even more startling, as this portfolio is built on information that is already known in the market for 240 to 360 days. This simple fact thus refutes the rational-agents and efficient-markets hypothesis. Arguably, our findings

[31] The CSI 100 big-firm index covers the top-100 stocks ranked in terms of their market capitalization in the Shanghai and Shenzhen stock markets. The CSI 500 small-firm index then includes the stocks ranked from 300 to 800 in terms of market capitalization. The CSI value-firm index and the CSI growth-firm index identify value firms and growth firms by a Z-score covering the book-to-market ratio, P/E ratio, dividend yield ratio, and cash-flow yield ratio. For details on the composition of these indices, see http://www.csindex.com.cn/sseportal_en/csiportal/zs/indexreport.do?type=1.

[32] We used 3-lags, 5-lags and 10-lags blocks, we obtain similar results. We report the results by using 5-lag block.

suggest that issuers and their investment banks were able to successfully spot investor overvaluation and to market the offering. So, they *deliberately* decided to exploit stock market investors at IPO-time by raising more capital than needed, i.e. over-issuance. To obtain further insights into the nature of this process, we need to also examine how over-issuance relates to the investment-bank fee rate and the first-day abnormal return.

2.5.2. The relation among over-issuance, fee rates, and first-day abnormal returns

To identify the relation among over-issuance, investment-bank fee rates, and first-day abnormal returns, we adopt a simultaneous equations approach, consisting of three equations. In the over-issuance equation, we include the first-day abnormal return and the investment-bank fee rate as explanatory variables; and vice versa for the other two equations. Next, we need to find at least as many excluded exogenous variables as the number of endogenous variables in the system to fulfill the order condition for identification of this simultaneous equations system. For the over-issuance equation, we scale the firm's planned investment amount by total assets in the quarter before IPO and add this variable as an extra regressor. When finance requirements arising from prospective investment projects are already extensive, we expect IPO firms to find it more difficult to raise even more capital at their IPO. So, we hypothesize a negative coefficient on this variable in the over-issuance equation. Besides, we add the ratio of cash to total assets in the quarter before IPO. The reason is that firms with a larger amount of cash at hand may be less keen to accumulate even more cash at their IPO.

As to the fee-rate equation, we add the log of gross IPO proceeds and the square of this variable. Together, those variables account for a potentially U-shaped relation between gross IPO proceeds and investment-bank fee rates (see Dunbar, 2000; Altinkihc and Hansen, 2000; Kaserer and Kraft, 2003). Next, we include the proportion of star analysts employed by the IPO's lead manager. Loughran and Ritter (2004) find that as of the 1990s, issuers in the U.S.A. have put more weight on hiring lead managers with highly ranked financial analysts to ensure post-IPO research

coverage. For China, Huyghebaert and Xu (2013) find that the number of star analysts and the number of investment banks employing star analysts have increased substantially as of the year 2004. Investment banks may ask compensation for this extra service, for example by charging a larger fee rate to issuers.

For the first-day abnormal return regression, we calculate the ratio of fixed assets to total assets in the quarter preceding the IPO. When fixed assets (i.e. PPE) account for a larger fraction of total assets, we expect firms are easier to evaluate and, hence, the asymmetric-information problem should be smaller. Under the idea that information asymmetries are a major determinant of IPO underpricing, the fixed-assets ratio should correlate negatively with the first-day abnormal return. Besides, we follow Beatty and Ritter (1986) to add the number of planned investment projects in the IPO application documents as an extra regressor. According to the latter authors, the larger the number of projects, the harder it is for investors to gather sufficient and relevant information on all of these and, thus, the higher the information asymmetries surrounding the IPO. The correlation coefficient between the number of investment projects and the planned investment amount is only 0.02 and insignificant (*p*-value of 0.435), thereby pointing out that those two variables measure different concepts.

Finally, we add the following explanatory variables in all three regression equations: the log of total assets in the quarter before IPO, to account for the influence of firm size;[33] the standard deviation of the daily stock returns in the 120 trading days subsequent to the IPO as a proxy for issuer risk;[34] a dummy equal to one if direct and indirect state ownership in the issuing firm exceeds 50% at IPO-time, to account for the influence of the government; the last-year market share of the investment bank, to control for its reputation; the market return from 30 days to one day before the IPO, to proxy for the market sentiment preceding the offering; and a dummy that equals one if the

[33] Another control variable that is commonly used in the IPO literature is firm age. Yet, we have only information on firm age for 156 sample firms. Moreover, as many issuers in China are re-organized before their IPO to fulfill the conditions stipulated by the CSRC, many IPO firms are rather (and artificially) young. Not surprisingly, a number of scholars find that the age of the IPO firm is not significant to explain first-day abnormal returns (e.g., Chan *et al*., 2004; Francis *et al*., 2009).

[34] We have also tried with 90 days and 180 days; results prove comparable.

firm lists on the Shanghai stock exchange. We also control for industry and year fixed effects by means of industry dummies based on the CSRC industry classification and a year dummy that equals one for 2011. Our regression model thus looks as follows:

$$\begin{cases} Over\_issuance = C_1 + \gamma_1 Fee\_rate + \gamma_2 Abnormal\_return + \gamma_3 \ln(Planned\_investment) + \gamma_4 Cash\_ratio + \gamma_5 \ln(Assets) + \\ \qquad \gamma_6 Volatility + \gamma_7 SOE\_dummy + \gamma_8 Market\_\text{share} + \gamma_9 Market\_\text{return} + \gamma_{10} Market\_dummy + \sum_{i=1}^{12} \theta_i Ids_i + \gamma_{11} Year + \varepsilon_1 \\ Fee\_rate = C_2 + \beta_1 Over\_issuance + \beta_2 Abnormal\_return + \beta_3 \ln(Gross\_proceeds) + \beta_4 (\ln(Gross\_proceeds))^2 + \beta_5 Star\_analyst + \\ \qquad \beta_6 \ln(Assets) + \beta_7 Volatility + \beta_8 SOE\_dummy + \beta_9 Market\_\text{share} + \beta_{10} Market\_\text{return} + \beta_{11} Market\_dummy + \sum_{i=1}^{12} \theta_i Ids_i + \beta_{12} Year + \varepsilon_2 \\ Abnormal\_return = C_3 + \alpha_1 Over\_issuance + \alpha_2 Fee\_rate + \alpha_3 Fixed\_assets\_ratio \ln(Assets) + \alpha_4 \text{Pr}oject\_number + \alpha_5 \ln(Assets) + \\ \qquad \alpha_6 Volatility + \alpha_7 SOE\_dummy + \alpha_8 Market\_\text{share} + \alpha_9 Market\_\text{return} + \alpha_{10} Market\_dummy + \sum_{i=1}^{12} \theta_i Ids_i + \alpha_{11} Year + \varepsilon_3 \end{cases}$$

with:

Over-issuance: Net IPO proceeds / planned investment amount.

Fee rate: (Underwriting fee + sponsor fee) / gross IPO proceeds.

Abnormal return: ((First-day closing price – offer price) / offer price) – first-day market return.

Planned investment: Planned investment amount / total assets in the quarter before IPO.

Cash ratio: Issuer cash and cash equivalents / total assets in the quarter before IPO.

Gross proceeds: IPO proceeds before deducting any IPO-related costs.

Star analyst: Fraction of star analysts employed by the lead manager in the year before IPO.

Fixed assets ratio: Issuer fixed assets / total assets in the quarter before the IPO.

Project number: Number of planned investment projects in the IPO application documents.

Assets: Issuer total assets in the quarter before IPO.

Volatility: The standard deviation of the issuer's daily stock returns from 1st to 120th trading day after the IPO.

SOE dummy: Dummy equal to one if the Chinese state controls more than 50% of the firm's shares before the IPO, zero otherwise.

Market share: Total gross proceeds of the IPOs underwritten by the lead manager relative to the total gross proceeds raised in all IPOs in the previous year.

Market return: Return on the market index from 30 days to 1 day before the IPO; the market index is either the Shanghai or the Shenzhen composite index, depending on the firm's listing.

Market dummy: Dummy equal to one if the issuer lists in Shanghai, zero otherwise.

Ids: Industry dummies according to the CSRC industry classification code.

Year: Dummy equal to one for the year 2011, zero for the year 2010.

Table 2.8 reports summary statistics on the various test and control variables, whereas Table 2.9 shows the 3SLS regression output. We implemented the Hansen *J*-test equation by equation; as all *p*-values are well above 0.10, the validity of our instruments seems supported. Besides, Stock and Yogo (2005) point out that the instrumental regression estimators will be biased when the instruments are not strong, i.e. when the instruments can explain only a limited portion of the variance in the endogenous variables. They argue that an *F*-statistic above ten in the first-stage regression is an indication of strong instruments. Table 2.9 reveals that those *F*-statistics, equation by equation, are all well above ten.

Next, the results in Table 2.9 support our hypotheses arising from the investor-exploitation rationale. Specifically, we find that a larger investment-bank fee rate significantly enhances over-issuance, which confirms the idea that a larger fee rate encourages investment banks to actively time the IPO market. Meanwhile, over-issuance also significantly enlarges the fee rate. So, investment banks themselves seem to benefit from a better timing of the IPO market, too. The latter finding also verifies what was reported by the Chinese media, i.e. issuers intentionally include an over-issuance clause in their underwriting contract with investment banks to reward them for higher over-issuance. The coefficient on over-issuance in the fee-rate equation equals 0.005, indicating that if over-issuance can be increased from one to two, issuers would pay their investment banks an

additional 0.5 cents on every Yuan raised. As the average over-issuance in our sample amounts to 2.55, this corresponds to an extra 0.75% fee rate. As total IPO proceeds raised in 2010–2011 equal RMB 582 billion, we infer that issuers paid an *additional* RMB 4.37 billion in fees to investment banks as a result of over-issuance. This translates into an extra fee of RMB 7.44 million for the average IPO. In sum, we find strong empirical support for Hypothesis 2.

Keeping the investment-bank fee rate constant, we find that over-issuance and the first-day abnormal return significantly negatively influence each other. The over-issuance regression shows that a 10 percentage points increase in the first-day abnormal return reduces over-issuance by 0.70. The average first-day abnormal return equals 33%; a 10 percentage points increase is thus a 30.0% increase from the mean. The average over-issuance in our sample is 2.55; a reduction by 0.70 is thus a 27.5% reduction from the mean. Together, those results confirm Hypothesis 3, i.e. investment banks need to find a balance between raising more capital for issuers and rewarding primary-market investors to ensure their participation in future IPOs. As a result, over-issuance and the first-day abnormal return tend to correlate negatively with each other.

Overall, the above findings comply with the investor-exploitation explanation and fail to support the rational-agents and efficient-markets theory. Our results further show that once accounting for investor exploitation, the issuing amount, the investment-bank fee rate, and the first-day abnormal return become endogenous. A correct empirical approach should thus account for this endogeneity. Although not conjectured, we also find a significant positive impact of the investment-bank fee rate on the first-day abnormal return. This outcome is in line with earlier findings by Chen and Mohan (2002). Yet, it also provides further support to the investor-exploitation explanation: with a larger fee rate, investment banks likely market the IPO more aggressively and thus induce a higher investor valuation of the IPO firm, thereby enlarging the first-day abnormal return, everthing else constant.

The coefficients on the control variables are largely as expected. Firms with a larger planned investment amount and a larger amount of cash reserves engage less in over-issuance,

although the cash ratio is only marginally significant (*p*-value of 0.13). Next, in line with the literature, the fee rate bears an U-shaped relation with gross IPO proceeds (Dunbar, 2000; Altinkihc and Hansen, 2000). However, the fraction of star analysts has no effect on fee rates (*p*-value of 0.66). The fixed assets ratio correlates negatively, while the number of investment projects correlates positively with the first-day abnormal return. In line with theoretical arguments, those results thus indicate that the higher the information asymmetries surrounding the offering, the more IPOs are underpriced.

The riskiness of the issuer, as measured by its daily stock return volatility, significantly positively influences over-issuance. As the volatility of stock returns can also be considered as a measure of the divergence in opinion among investors about the issuer's true worth, this finding might reflect that a larger volatility allows to better exploit stock market investors, without investors being able to detect such an abuse. Next, the issuer's stock return volatility also significantly positively influences the first-day abnormal return, in line with the IPO literature. However, the riskiness of the IPO firm does not influence the investment-bank fee rate. Under the rational-agents and efficient-markets theory, investment banks should demand a larger fee rate when the issuer is riskier, to compensate them ex ante for their higher probability of ending up with buying unsold IPO shares. Riskier firms are indeed harder to value. In contrast, under the investor-exploitation explanation, even when investment banks value the issuer too high by mistake, as long as they can correctly assess and positively influence investor sentiment about the offering, they might still be able to sell the IPO shares to primary-market investors. So, the riskiness of the IPO firm should not necessarily increase the investment-bank fee rate under the investor-exploitation rationale.

Next, state-owned IPO firms are associated with higher over-issuance, suggesting that a stock market quotation by itself cannot put financial discipline on SOEs, which usually have a long tradition in enjoying soft budget constraints. This result also indicates that the intension of raising large cash to reduce bankruptcy risk unlikely explain over-issuance. SOEs enjoy soft budget constrains; if buffering bankruptcy risk indeed drives over-issuance, we should observe SOEs to

associate with *lower* over-issuance instead of *higher*. Our observation clearly points to the opposite. Next, SOEs pay a lower fee rate to their investment banks, everything else constant. Maybe the latter finding can be related to the fact that the government is repetitively involved in listing its SOE firms, which provides it with extra bargaining power vis-à-vis investment banks when it comes to negotiating fee rates. Finally, in line with the existing literature, the IPOs of Chinese SOEs are associated with a huge first-day abnormal return (e.g., Guo and Brooks, 2008; Huyghebaert and Quan, 2009).

The investment bank's market share bears no significant relation to over-issuance, thereby indicating that big and small investment banks behave similarly in exploiting stock market investors. Yet, market share does have a significant positive effect on investment-bank fee rates, pointing at a market-power premium for big investment banks. However, in contrast to Western economies (Booth and Smith, 1986; Carter and Manaster,1990), we find that investment banks with a higher market share cannot reduce first-day abnormal returns in China. Although prior research has considered investment-bank market share as a proxy for the underwriter's reputation, Huyghebaert and Xu (2013) show that investment banks in China never gained market share by certifying issuer quality; in the Chinese case, a higher market share may therefore not necessarily be an indicator of the bank's reputation.

The market return before the IPO positively influences over-issuance as well as the first-day abnormal return. As the pre-IPO market return captures overall investor sentiment in the stock market, it is not surprising to find that this variable correlates positively with both variables. Interestingly, the market dummy, which proved significant univariately in Table 2.1, becomes insignificant to explain over-issuance after controlling for issuer-specific variables.

Due to the big differences between the IPOs of state-owned enterprises and private-controlled firms, we subsequently split our sample based upon the identity of the firm's controlling shareholder and re-run the above model. Table 2.10 reports the results. Interestingly, the full-sample regression results as to the interactions among over-issuance, investment-bank fee rates, and

first-day abnormal returns show up in both subsamples. Next, the investment banks with a higher market share were able to secure a larger fee rate from their private-controlled clients, but not from their SOE clients. This outcome is in line with our earlier conjecture that as the Chinese state is a repetitive participant in the IPO market, SOEs have greater bargaining power when it comes to negotiating fee rates.

Table 2.8.
Summary statistics on the variables used in over-issuance, fee rate and first-day abnormal return regressions.

In this table, we provide summary statistics on the variables used in the regressions of Tables 9 and 10. The sample includes the firms listed between January 1, 2010 and December 31, 2011, excluding any financial institutions. *Over-issuance* is net IPO proceeds divided by total planned investment amount. *Fee rate* is the sum of underwriting fees and sponsor fees, divided by gross IPO proceeds. *Abnormal return* is the first-day abnormal return of every IPO. *Planned investment* is the planned investment amount divided by the firm's total assets before IPO. *Cash ratio* is the total of cash and cash equivalents divided by the firm's total assets at the end of the quarter before IPO. *Gross proceeds* is total gross IPO proceeds, in RMB billion. *Star analyst* is the fraction of star analysts employed by the lead manager relative to the total number of star analysts in the year before IPO. *Fixed assets ratio* is total fixed assets divided by total assets in the quarter before IPO. *Project number* is the total number of planned investment projects disclosed in the IPO application documents. *Assets* is the firm's total assets before IPO, in RMB billion. *Volatility* is the standard deviation of daily stock returns in the 120 trading days after the IPO. *SOE dummy* is a dummy equal to one if the Chinese state controles more than 50% of the issuer's voting rights before IPO. *Market share* is the market share of the lead manager in the year before IPO, calculated by dividing the total gross IPO proceeds an investment bank raised in a particular year by the total gross proceeds raised in all IPOs in that year. *Market return* is the market return in the 30 days before IPO. *Market dummy* equals one if the firm lists on the Shanghai stock exchange and zero otherwise.

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Over-issuance	560	2.552	2.372	1.155	0.361	11.694
Fee rate	560	0.055	0.052	0.020	0.013	0.136
Abnormal return	560	0.330	0.231	0.374	-0.111	2.671
Planned investment	560	0.593	0.520	0.373	0.021	3.775
Cash ratio	560	0.205	0.156	0.157	0.017	0.850
Gross proceeds	560	1.022	0.720	1.150	0.171	13.500
Star analyst	560	0.037	0.147	0.047	0.0000	0.182
Fixed assets ratio	560	0.255	0.254	0.159	0.004	0.859
Project number	560	2.875	3	1.714	1	24
Assets	560	1.568	0.548	7.770	0.093	160.686
Volatility	560	0.028	0.028	0.006	0.012	0.052
SOE dummy	560	0.131	-	-	-	-
Market share	560	0.036	0.024	0.047	0.000	0.344
Market return	560	-0.002	-0.010	0.083	-0.209	0.207
Market dummy	560	0.0875	-	-	-	-

Table 2.9. Over-issuance, fee rate and first-day abnormal return regressions

This table reports the 3SLS regression output of a simultaneous equation system consisting of three equations. In each equation, we use over-issuance (*Over-issuance*), the investment-bank fee rate (*Fee rate*), or the first-day abnormal return (*Abnormal return*) as dependent variable. We then put the two other variables on the right-hand-side and control for some other variables. *Planned investment* is the planned investment amount divided by the firm's total assets before IPO. *Cash ratio* is the total of cash and cash equivalents divided by the firm's total assets at the end of the quarter before IPO. *Gross proceeds* is total gross IPO proceeds, in RMB billion. *Star analyst* is the fraction of star analysts employed by the lead manager relative to the total number of star analysts in the year before IPO. *Fixed assets ratio i*s fixed assets divided by total assets in the quarter before IPO. *Project number* is the total number of planned investment projects disclosed in the IPO application documents. *Assets* is the firm's total assets before IPO, in RMB billion. *Volatility* is the standard deviation of daily stock returns in the 120 trading days after the IPO. *SOE dummy* is a dummy equal to one if the Chinese state controls more than 50% of the issuer's voting rights before IPO. *Market share* is the market share of the lead manager in the year before IPO, calculated by dividing the total gross IPO proceeds an investment bank raised in a particular year by the total gross proceeds raised in all IPOs in that year. *Market return* is the market return in the 30 days before IPO. We take the CSRC industry classification to construct industry dummies. *Market dummy* equals one if the firm lists on the Shanghai stock exchange and zero otherwise. We also include a year dummy for 2011. Hansen's *J* test is based on equation by equation instrumental regressions. *F*-statistics are the calculated equation by equation on the first-stage regressions, with H0 hypothesis that all instrumental variables have zero influence on the endogenous variables. Coefficients significant at the 10%, 5%, and 1% level are marked with *, **, and ***, respectively.

	Over-issuance	**Fee rate**	**Abnormal return**
Intercept	-6.939	0.184	-0.840
	(0.441)	(0.522)	(0.132)
Over-issuance	-	0.005***	-0.060***
		(<0.001)	(<0.001)
Fee rate	134.411***	-	9.171***
	(<0.001)		(<0.001)
Abnormal return	-7.054***	0.097	-
	(<0.001)	(0.725)	
Ln(Planned investment)	-0.388***		-
	(<0.001)		
Cash ratio	-0.077		
	(0.130)		
Ln(Gross proceeds)	-	-0.007***	-
		(0.795)	
Ln(Gross proceeds) squared	-	0.001***	-
		(0.800)	
Star analyst	-	-0.020	-
		(0.661)	
Fixed assets ratio	-	-	-0.003***
			(<0.001)
Project number	-	-	0.002*
			(0.06)
Ln(Assets)	-0.033	-0.002	0.017
	(0.937)	(0.125)	(0.461)
Volatility	370.548***	-2.226	22.858***
	(<0.001)	(0.802)	(<0.001)
SOE dummy	2.832***	-0.017***	0.175***
	(<0.001)	(<0.001)	(0.003)
Market share	-4.125	0.047*	-0.293
	(0.347)	(0.056)	(0.371)
Market return	20.919***	-0.122	1.279***
	(<0.001)	(0.120)	(<0.001)
Market dummy	1.524	-0.009	0.093
	(0.162)	(0.131)	(0.120)
Industry dummies	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes
p-value of Chi-square test	<0.001	<0.001	<0.001
p-value of Hansen's *J*-test	0.224	0.631	0.801
F-statistic	326	11.20	17.12
Number of observations	560	560	560

Table 2.10

Over-issuance, fee rate and first-day abnormal return regressions: The role of owner identity

This table reports the 3SLS regression output of a simultaneous equation system consisting of three equations. In each equation, we use over-issuance (*Over-issuance*), the investment-bank fee rate (*Fee rate)*, or the first-day abnormal return (*Abnormal return*) as dependent variable. We then put the two other variables on the right-hand-side and control for some other variables. *Planned investment* is the planned investment amount divided by the firm's total assets before IPO. *Cash ratio* is the cash and cash equivalents divided by the firm's total assets at the end of the quarter before IPO. *Gross proceeds* is total gross IPO proceeds, in RMB billion. *Star analyst* is the fraction of star analysts employed by the lead manager relative to the total number of star analysts in the year before IPO. *Fixed assets ratio* is fixed assets divided by total assets in the quarter before IPO. *Project number* is the total number of planned investment projects disclosed in the IPO application documents. *Assets* is the firm's total assets before IPO, in RMB billion. *Volatility* is the standard deviation of daily stock returns in the 120 trading days after the IPO. *Market share* is the market share of the lead manager in the year before IPO, calculated by dividing the total gross IPO proceeds an investment bank raised in a particular year by the total gross proceeds raised in all IPOs in that year. *Market return* is the market return in the 30 days before IPO. *Market dummy* equals one if the firm lists on the Shanghai stock exchange and zero otherwise. We take the CSRC industry classification to construct industry dummies. We also include a year dummy for 2011. We split our whole sample into *Private-controlled firms* and *SOEs. Private-controlled firms h*ave non-state owners controlling more than 50% of the firm's voting rights before IPO; if not, they are classified as SOEs. Coefficients significant at the 10%, 5%, and 1% level are marked with *, **, and ***, respectively.

	Private-controlled firms			**State-controlled firmss**		
	Over-issuance	**Fee rate**	**Abnormal return**	**Over-issuance**	**Fee rate**	**Abnormal return**
Intercept	-12.216 (0.232)	0.948* (0.086)	-0.751 (0.120)	36.955 (0.133)	1.238 (0.340)	1.750 (0.391)
Over-issuance	-	0.004*** (0.001)	-0.045*** (<0.001)	-	0.003* (0.080)	-0.096*** (0.002)
Fee rate	177.301*** (0.001)	-	8.429*** (<0.001)	90.367*** (<0.001)	-	5.024*** (0.001)
Abnormal return	-10.004*** (<0.001)	0.088 (0.925)	-	-6.818*** (0.001)	0.056 (0.353)	-
Ln(Planned investment)	-0.270*** (<0.001)		-	-0.131* (0.070)	-	-
Cash ratio	-0.377 (0.181)	-	-	-0.486* (0.095)	-	-
Ln(Gross proceeds)		-0.079*** (<0.001)			-0.091 (0.462)	
Ln(Gross proceeds) squared		0.002** (0.050)	-	-	0.002** (0.046)	-
Star analyst	-	-0.014 (0.683)	-	-	0.009 (0.205)	-
Fixed assets ratio	-	-	-0.019*** (<0.001)	-	-	-0.034 (0.822)
Project number	-	-	-0.001 (0.140)	-	-	0.005 (0.105)
Ln(Assets)	-0.209 (0.615)	-0.001 (0.946)	-0.001 (0.675)	1.543 (0.241)	-0.003 (0.193)	0.070 (0.402)
Volatility	493.156*** (<0.001)	2.009 (0.702)	22.375*** (<0.001)	274.860*** (0.001)	1.986 (0.350)	41.376*** (0.001)
Market share	-5.598 (0.335)	0.050*** (0.004)	-0.275 (0.369)	0.167 (0.974)	0.014 (0.676)	0.164 (0.820)
Market return	27.338*** (<0.001)	-0.104 (0.201)	1.234*** (0.001)	15.931*** (0.001)	0.137* (0.071)	2.072*** (0.001)
Market dummy	2.499 (0.138)	0.011 (0.611)	0.112 (0.750)	0.205 (0.869)	0.005 (0.531)	-0.016 (0.924)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
p-value of Chi-square test	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Number of obs.	486	486	486	74	74	74

2.6. Conclusions

In this paper, we start from the startling observation that during the period Jan. 1, 2010 – Dec. 31, 2011, the average Chinese domestic IPO firm raised equity 2.55 times the amount of capital needed for its planned investment projects, i.e. over-issuance. By examining the usage of over-issued capital after the firm's first listing, we find evidence that it is indeed excessive, i.e. corresponding to no real investment projects. On average, 78% of the capital raised by issuers at IPO-time remains kept in the cash and cash equivalents account two years after listing. When trying to explain this phenomenon, we find empirical support for the investor-exploitation explanation, based on behavioral finance theory. Specifically, we provide compelling evidence to support the arguments raised by Loughran and Ritter (1995) that issuers and their investment banks take advantage of transitory windows of opportunity by issuing equity when, on average, the firm's shares are substantially overvalued. We offer evidence that issuers and investment banks tend to exploit investors in IPOs, which corresponds to what has been argued by Rajan and Servaes (1993), Baker and Wurgler (2002), and Ljungqvist *et al.* (2006), among others. More specifically, and in line with Pagano *et al*. (1998), investment banks seem to identify the overvalued industries and then advice potential issuers in those industries about the process of listing. Also, we show that investor overoptimism gives rise to short-term overshooting and long-term underperformance of those overvalued IPO stocks. Finally, we demonstrate that once accounting for the investor-exploitation intention, the issue amount, the investment-bank fee rate, and the first-day abnormal return are endogenously related to one another. We thus conclude that issuers and investment banks in Chinese domestic IPOs took huge advantage of the overoptimism of stock market investors and successfully sold overpriced IPO shares during the period 2010–2011. Overall, rational-agents and efficient-markets theory is hard to reconcile with our findings.

Our paper has several policy implications. First, we suggest the regulator to encourage long-term investors, by such policies as waiving the capital-gains tax on investors who hold on to their IPO shares for a minimum period. Our analysis shows that market sentiment is transitory; it

induces a short-term boost of market prices, but this effect ultimately wanes and drags down stock prices. Long-term investors have to focus more on analyzing the firm's fundamentals when buying IPO shares rather than relying on the (transitory) market sentiment. Encouraging the participation of long-term investors could therefore bring more rationality to the IPO market and reduce over-issuance. Second, we suggest the regulator to forbid a linkage between investment-bank fee rates and over-issuance in underwriting contracts. Such linkages encourage investment banks to raise unnecessary capital in IPOs. Yet, investment banks should not be rewarded for over-issuance but for offering appropriate certification and advice/support to issuing firms. Third, our analyses show that investment banks with a higher market share are not associated with lower over-issuance. This finding thus indicates that up till now, Chinese investment banks have built their market share by helping issuers to raise more funds, rather than by establishing their reputation as 'safeguard' of investors' interests. So, regulation and law enforcement should be strengthened in the Chinese domestic IPO market. Fourth, our analyses reveal that SOEs are associated with higher over-issuance in the primary market. As a repetitive issuer in the IPO market, the government should voluntarily restrain its SOEs from raising excessive capital, especially when stock market investors remain overenthusiastic about privatization IPOs.

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CHAPTER 3

Does IPO underwriting influence the post-IPO earnings forecasts of affiliated financial analysts? Evidence from a Chinese natural experiment.

3.1. Introduction

In the financial analysts literature, a stream of research focuses on the investment advice of a specific group of financial analysts: the *affiliated analysts*, i.e. the analysts that are employed by an investment bank/brokerage firm that maintains another relationship with the firm being covered.[35] This research has shown that those affiliated financial analysts tend to issue more positively biased investment recommendations, earnings forecasts, and target prices than non-affiliated analysts do (for a good review, see Mehran and Stulz, 2007 and Ramnath *et al.*, 2008). However, this research was not yet able to conclude on the exact mechanism(s) that drive this *relative bias*. Specifically, it is possible that affiliated financial analysts are genuinely more optimistic about the firms they cover. Alternatively, affiliated analysts may intentionally distort their investment advice because of inappropriate incentives. Gaining more insights into the mechanisms underlying this relative forecast bias clearly is important, particularly for investors and regulators.

To examine this research question in more detail, we focus on the affiliation resulting from IPO underwriting, which is one of the most important relationships between investment banks and firms becoming listed for the first time. IPO underwriting may facilitate an investment bank's access to subsequent business with this same firm, such as from seasoned equity offerings, M&A advice, etc. (James, 1992; Krigman *et al.*, 2001). Moreover, successfully managing an IPO can be considered as a proof of the investment bank's capabilities, thereby positively affecting its market share in future IPOs as well (Ritter and Rydqvist, 1994). In general, IPO candidates tend to choose their IPO underwriter(s) in a *beauty contest*, considering the various conditions that investment

[35] Sell-side financial analysts are analysts working at investment banks/brokerage firms that offer investment advice to their clients. Buy-side financial analysts work for institutional investors at the investor's own account. Likewise most literature on financial analysts, we only consider sell-side financial analysts in this article. So, in the remainder of this paper, the term 'financial analyst' or 'analyst' uniquely refers to those sell-side financial analysts.

banks offer. Investment banks that value the issuer more highly likely are willing to endorse a higher offer price and to accept a lower IPO fee rate. Correspondingly, those investment banks tend to be selected as (lead) manager for the firm's IPO, *ceteris paribus*. As the corporate finance department and the research department of investment banks often work closely together in IPOs to generate synergies (Eccles and Dwight, 1988), it is intuitively plausible that the financial analysts employed by the IPO lead manager are naturally more optimistic about the issuer, given that their bank obtained the IPO underwriting mandate, i.e. a *self-selection effect* arises. Correspondingly, those affiliated financial analysts may also release more positively biased reports shortly after the IPO than non-affiliated analysts do. We call this explanation the 'analyst-optimism view'.

Next, we also need to consider that, just because of the IPO underwriting mandate, analysts affiliated with the IPO lead manager are able to establish more intense contacts with firm management and can accumulate a more in-depth understanding of the issuer's business. Hence, those affiliated financial analysts could obtain a more accurate view as to the IPO firm during the underwriting process and, thus, are able to issue more precise forecasts shortly after the IPO than non-affiliated analysts do. If those affiliated financial analysts subsequently rely on their private information to establish their forecasts, we can expect that their forecast errors, if any, will be small and random, i.e. not in one direction. In contrast, the forecasts of non-affiliated financial analysts will be based on other, less precise inputs; hence, they might be influenced by the prevailing market conditions (see also Bergman and Roychowdhury, 2008; Walther and Willis, 2013). As a result, non-affiliated analysts might exhibit positive forecast errors in times of bullish stock market conditions and negative forecast errors when stock markets are bearish. We call this explanation the 'information-advantage view'.

Finally, building on Michaely and Womack (1999) and James and Karceski (2006), affiliated financial analysts could *intentionally* release a (more) positively distorted opinion as to the IPO firm in order to provide post-IPO price support. Post-IPO price support, which has been defined as underwriters' activities to keep the aftermarket stock price above the IPO offer price in a short

period after the firm's listing, is a common practice among underwriters in U.S. IPOs (e.g., Hanley *et al*., 1998; Aggarwal, 2000). The IPO underwriting contract between issuers and their investment bank(s) often explicitly foresees in post-IPO price support as a way to stabilize the issuer's stock price in the aftermarket; in the U.S.A., this is usually for the first 30 days after listing (Aggarwal, 2000). Then, investment banks actually have engaged in a contract that imposes some obligations on them. Alternatively, investment banks may also face a self-imposed rationale to support the issuer's stock price in the aftermarket. As the IPO offer price is usually fixed by the IPO lead manager, primary-market investors could blame the lead manager for having set the offer price too high once the stock price drops below the IPO offer price in the aftermarket and, hence, lose their interest to participate in any future IPOs organized by this same underwriter. To maintain their reputation among primary-market investors, IPO underwriters may decide to offer post-IPO price support, at least in a short period after the IPO (see also Lewellen, 2006). To achieve a stable stock price in the aftermarket, underwriters may require their analysts to be more positive as to the IPO firm in their investment recommendations, earnings forecasts, and target prices, particularly when the issuer's stock price comes under pressure in the aftermarket. Lacking this same rationale, non-affiliated financial analysts do not face any incentives to distort their investment advice in a way to provide post-IPO price support.[36] We call this view the 'post-IPO price-supporting view'.

In this paper, we test the empirical validity of the above three rationales – i.e. affiliated analysts are truly more optimistic, affiliated analysts have more accurate information, and/or affiliated analysts' incentives are distorted – by relying on the annual earnings forecasts of IPO firms that were released shortly after the firm's first listing in a Chinese domestic stock market. China indeed proves interesting for this research, because of the major regulatory change that took

[36] We do not say that non-affiliated financial analysts face no incentives whatsoever to release a positively biased investment advice. For example, as pointed out by James and Karceski (2006) and Mehran and Stulz (2007), both affiliated and non-affiliated analysts may positively distort their opinion to attract future investment banking and brokerage business, to keep a good relationship with firm managers, etc. However, those incentives are common among affiliated and non-affiliated analysts; so, if the behavior of affiliated analysts is driven *only* by those incentives, we do not expect to find any differences between the forecasts of affiliated analysts and non-affiliated analysts. What we argue is that the post-IPO price-supporting incentive is *unique* to affiliated financial analysts, which could incite those analysts to release a *more* positively biased opinion as to the IPO firm than non-affiliated analysts do.

place as regards IPO pricing on June 10, 2009. Specifically, on June 10, 2009, investment banks in Chinese domestic IPOs – for the first time – became fully responsible for fixing the IPO offer price, together with issuers; before that, the IPO offer price was largely set by the regulator, by applying a maximum P/E ratio to the issuer's earnings. After June 10, 2009, this P/E ratio cap was formally abolished and the IPO offer price henceforth became fully determined by issuers and their investment banks after a bookbuilding procedure among institutional investors. Arguably, the regulatory change of June 10, 2009 seems to offer a good *natural experiment* to test the causal relation between the need to provide post-IPO price support and affiliated-analysts' forecast bias. If financial analysts affiliated with the IPO lead manager only exhibit optimism and/or are better informed relative to non-affiliated analysts, they should not behave differently (relative to non-affiliated analysts) after the regulatory change. So, if the analyst-optimism view is true, the forecasts issued by affiliated financial analysts should be more positive than those of non-affiliated analysts, both before and after the regulatory change. Likewise, if the information-advantage view applies, affiliated financial analysts should persistently release less biased and more accurate forecasts than non-affiliated ones do. In contrast, the regulatory change of June 10, 2009 has hugely affected IPO underwriters' incentives to provide post-IPO price support. Obviously, the pre-condition for offering post-IPO price support is that the issue price should be set at least in part by the IPO lead manager; otherwise, investment banks take no responsibility as to the IPO offer price.

In this article, we examine the EPS forecasts issued by affiliated and non-affiliated financial analysts in the first year after IPO for the firms becoming listed in Mainland China during 2004–2011. So, the EPS forecasts in our sample were released during the period 2004–2012. Although the stock exchanges in Shanghai and Shenzhen were already re-established at the beginning of the 1990s, the business of financial analysis in China has only a short history. The first regulation on this type of activity was published only in 1999. Also, the first ranking of financial analysts was made publicly available only at the end of 2003. Overall, the data quality as regards financial

analysts was rather poor before 2004. However, together with the fast development of Chinese domestic stock markets, the business of financial analysis has grown rapidly. According to the data we compiled, 90 investment banks/brokerage firms employed 1,630 financial analysts in the year 2012; together, they published 112,945 earnings forecasts on 1,931 listed companies. Chinese analysts usually release their opinion on a firm by means of annual EPS forecasts and investment recommendations. However, over 90% of the recommendations in our dataset appeared to be either 'buy' or 'strong buy'. This lack of variation in investment recommendations prevented us from making a meaningful analysis on this type of analyst output, which is the main reason why we focus on earnings forecasts in this study. Yet, at the same time, the huge number of 'buy' and 'strong buy' recommendations already suggests that the investment advice of financial analysts could be hugely distorted in China.

Our empirical findings overwhelmingly confirm the view that the wish to provide post-IPO price support incites financial analysts affiliated with the IPO lead manager to release more positively biased earnings forecasts than non-affiliated analysts do. Specifically, we find that over the full sample period (2004–2012), both affiliated and non-affiliated financial analysts issue severely positively distorted forecasts. However, we detect no significant difference in the forecast bias between affiliated and non-affiliated analysts before the regulatory change. Conversely, after the regulatory change, the forecast error of analysts affiliated with the IPO lead manager is on average 33 percentage points bigger than that of non-affiliated analysts. Moreover, in the 90 days after listing, this relative bias even increases to 63 percentage points and enlarges further when the issuer's stock price dropped below the IPO offer price in the aftermarket. Arguably, our results cannot be reconciled with the view that affiliated financial analysts *unintentionally* release more positively biased forecasts than non-affiliated ones because of their relative optimism on issuing firms. Under the latter view, affiliated financial analysts should always issue more positively biased forecasts than non-affiliated ones, no matter before or after the regulatory change, in or out the lock-up period, with a high or low issuer share price in the aftermarket. Our results also refute the view

that the presumed information advantage enjoyed by affiliated analysts incites them to offer *less* biased forecasts. Moreover, our forecast-accuracy regressions show that affiliated financial analysts also do not release more accurate forecasts than non-affiliated analysts do, thereby rejecting the idea that those affiliated analysts are better informed as to the issuing firm. Finally, we find that affiliated financial analysts tend to distort especially the EPS forecasts of fiscal years further away from the forecast release date. From this finding, we conclude that affiliated analysts actually try to strategically mask their post-IPO price-supporting activities, as the distortion of long-run forecasts is less likely to be noticed by investors than that of short-term forecasts. Together, our findings point out that affiliated financial analysts *intentionally* distort their EPS forecasts to offer post-IPO price support.

Interestingly, using U.S. data, Michaely and Womack (1999) find that shortly after a firm's IPO, financial analysts affiliated with the IPO lead underwriter tend to offer more positive investment recommendations than non-affiliated analysts do. Likewise, James and Karceski (2006) show that affiliated financial analysts release higher target prices than non-affiliated analysts do. When explaining their observations, they intuitively assume that affiliated analysts aim to provide a 'boost shot' to the stock price of IPO firms in the aftermarket. However, they do not further explain why affiliated financial analysts may wish to offer this 'boost shot'; neither do they test this 'boost-shot' assumption. To the best of our knowledge, we are the first to explicitly put forward the post-IPO price-supporting view to explain affiliated analysts' forecast distortion, trying to differentiate it from other rationales. By relying on the natural experiment that took place in the Chinese domestic IPO market, we find overwhelming empirical support for such a price-supporting incentive.

The remainder of this paper is organized as follows. In Section 3.2, we briefly review the institutional aspects of Chinese domestic IPOs that are relevant to our analysis and to the development of the financial-analysts service industry in China. In Section 3.3, we develop our hypotheses based on the current literature. In Section 3.4, we empirically examine those hypotheses and discuss our main findings. Finally, Section 3.5 concludes the paper.

3.2. Institutional background

3.2.1. The development of the Chinese IPO mechanism

The Shanghai and Shenzhen stock exchanges were re-established in 1990 and 1991, respectively. By the end of 2011, 2,342 firms became listed in these two markets, with a total market capitalization of RMB 21.48 trillion (USD 3.4 trillion). Since June 24, 1993, with the publication of 'The circulation on enhancing the role of securities underwriters and professional intermediaries in stock offerings' by the China Securities Regulatory Commission (CSRC), every IPO issuer has to assign an investment bank as lead manager for its IPO. Upon receiving a qualification from the CSRC, investment banks have to organize the whole IPO process, including performing the due diligence on the listing candidate and preparing the IPO application documents to be submitted with the CSRC. From 2004 to 2011, about 70 investment banks were active in the IPO underwriting market. Investment banks thus had to compete for IPO underwriting mandates, which is a lucrative business. The fee rate indeed averaged 4.2% of gross IPO proceeds over our sample period.

On June 10, 2009, a major regulatory change took place, with the publication of 'The guiding advice on further reform of the IPO pricing method', when the CSRC publicly announced that it would no longer interfere in the pricing of IPO shares and henceforth left the fixing of IPO offer prices to investment banks, issuers, and investors. Typically, the offer price now is set after conducting a bookbuilding exercise among institutional investors. However, before June 10, 2009, the IPO offer price had always been capped by a fixed P/E ratio. Every year, this fixed P/E ratio cap was set by the CSRC and applied to all IPOs in that year. To attract the interest of the general public for IPOs, the CSRC deliberately set the P/E ratio cap considerably below the prevailing market P/E ratio. P/E ratio caps were within the range of 13 to 16 during 1994–1999, much below the secondary-market P/E ratio of 15 to 58 (Francis *et al.*, 2009). During 2000–2004, the P/E ratio cap was about 20, while the market P/E ratio was between 24 and 58 (Tian, 2010). After Dec. 31, 2004, with the publication of Circulation No. 162, this official P/E ratio cap was given up. However, before June 10, 2009, the CSRC continued to manage IPO offer prices to some extent,

relying on an implicit P/E ratio cap of 30 for most IPOs (Gao, 2010). So, before June 10, 2009, the IPO offer price was mainly determined by the regulator; issuers and their investment banks had only little to say about the final offer price.

The above IPO pricing mechanism has provoked extremely high first-day abnormal returns. According to the numbers compiled on Jay Ritter's website, the first-day abnormal return in Chinese domestic IPOs is the third largest in the world, averaging to 133% in 1990–2010. Yet, studies report different numbers in different time periods. Su and Fleisher (1999) obtain 949% in 1987–1995, while Chi and Padgett (2005) find 129% in 1996–2000; Guo and Brooks (2008) report 93.49% between 2001 and 2005. The data we compiled show that the average first-day abnormal return for the firms listed from Jan. 1, 2004 to June 10, 2009 amounts to 87% (median of 79%). Those extremely high first-day abnormal returns have created a 'new-issue fetish', as it was called by the Chinese media. Investors blindly bought any new issues, paying only little attention to the quality of the IPO firm, as the CSRC almost guaranteed them to make money. The artificially low IPO offer price also reduced the odds that the issuer's stock price would drop below the offer price shortly after the IPO. According to our analysis, out of the 383 firms that became listed between Jan. 1, 2004 and June 10, 2009, only 60 issuers (15.7% of this subsample) saw their stock price declining below the IPO offer price at least once in the 90 days after listing. More importantly, during that period, issuers and investors had no reason to connect IPO offer prices to the pricing ability of investment banks, as IPO underwriters did not have much to say about the final offer price. In line with this idea, Huyghebaert and Xu (2013) find that the correct/incorrect underpricing of IPO shares never significantly influenced the market share of investment banks in Chinese domestic IPOs in that time frame. Correspondingly, before June 10, 2009, investment banks had only little incentives to offer post-IPO price support.

The real change came on June 10, 2009, with the enforcement of 'The guiding advice on further reform of the IPO pricing method'. With this guideline, the CSRC henceforth left the fixing of IPO offer prices to investment banks, issuers, and investors. Ever since, we notice several

interesting changes in the Chinese domestic IPO market. First, the average first-day abnormal return for the firms becoming listed after June 10, 2009 up till the end of 2011 declined to 28% (median of 22%). Second, out of the 711 firms becoming listed in that time frame, 306 issuers (43% of this subsample) saw their stock price dropping below the IPO offer price at least once in the 90 days after listing. Unlike in Western markets, investment banks in Chinese domestic IPOs have only scarcely used the green-shoe mechanism to stabilize the issuer's stock price in the aftermarket.[37] In fact, the green-shoe mechanism requires underwriters to take a short position in the issuer's stock, which was not allowed in China until March 31, 2010. Besides, Huyghebaert and Xu (2014) find evidence that issuers and investment banks may have aggressively priced IPO shares after June 10, 2009, thereby taking advantage of the overly optimistic investors in the stock market. All this evidence points in the same direction, i.e. investors face bigger chances of losing money when buying shares in an IPO after June 10, 2009.

Unlike retail investors, who can flip their initially allocated shares immediately after listing, institutional investors face a 90-day lock-up period for the IPO shares they obtained in the primary market.[38] Institutional investors in China – which include mutual funds, insurance companies, and pension funds – are thus exposed to a considerable price risk. Next, retail investors also play an important role in the secondary market. A report issued by the International Organization of Securities Commissions (IOSC) claims that retail investors hold a 83% stake of total market capitalization in China and contribute to 86% of total trading volume in 2010. Moreover, the 2011 year book of the China Securities Depository and Clearing Corporation (CSDCC) shows that by the end of 2010, individual investors held 151 million stock accounts in Shanghai and Shenzhen, while institutional investors held only 0.58 million accounts.

[37] Among the IPO firms in our sample, only one firm used it.

[38] In this 90-day window, only retail investors are allowed to sell their initially allocated shares. This is not to imply that trading volumes are low; in fact, for IPOs in the period 2004–2011, 52% of the shares sold at IPO-time were already traded on the first listing date.

3.2.2. The development of the financial analysis industry

In China, the business of financial analysis developed together with the stock exchanges. In the year 1999, a licensing system for financial analysts was established and since then, 'financial analyst' formally emerged as a specific career path in Chinese domestic stock markets. In July 2001, a disciplinary committee was created under the auspices of the Securities Association of China (SAC), to supervise those financial analysts. In the same year, the committee published 'The code of conduct for Chinese financial analysts', which serves as a guideline for the activities of financial analysts. The guideline stresses that financial analysts should guard their integrity; their advice should not be distorted by the interests of other departments within their organization, of securities issuers, or of institutional investors.

According to the data we compiled, the number of financial analysts and the earnings forecasts they release have grown exponentially since 2004. In 2004, only 360 financial analysts issued 2,595 earnings forecasts on 430 listed firms (31% of the population of listed firms); by 2012, 1,630 financial analysts released 112,945 EPS forecasts on 1,931 listed firms (84% of the population). In total, from 2004 to 2012, 3,484 financial analysts issued 421,221 earnings forecasts; an average analyst followed 8 firms and issued 40 EPS forecasts per year. For comparison, the average U.S. analyst followed 6 firms and released 20 EPS forecasts per year during the period 1983–2002 (Fang and Yasuda, 2009).

Most financial analysts are employed by investment banks and brokerage firms. In 2012, 90 investment banks/brokerage firms employed at least one financial analyst. The average investment bank/brokerage firm employed 20 financial analysts. Independent research firms are still rather scarce in China. In our dataset, we find only one major independent research firm whose 34 analysts (2% of the number of financial analysts) released 2,406 earnings forecasts in 2012 (2% of EPS forecasts). Six other independent research firms published no more than four research reports each.

The first ranking of financial analysts was published in 2003, by the financial magazine *New Fortune*, considering the assessments of analyst performance by institutional investors in the previous year. Since then, *New Fortune* publishes this list at the end of every year. The first list included only 24 star analysts, while the 2012 list comprised 127 star analysts. *New Fortune*'s list has become the most influential ranking of financial analysts in China.[39] Yet, turnover in the list is quite high. Among the 326 analysts who appeared at least once in the rankings between 2003 and 2012, 190 analysts (60% of the population) stayed on the list for less than two years. Only 58 analysts (18% of the population) appeared on the list for more than five years. Obviously, financial analysts in China may need more time to build their reputation.

3.3. Hypotheses

The current literature has clearly pointed out the existence of self-interested incentives among financial analysts, which may influence *both* affiliated and non-affiliated financial analysts when preparing their investment advice. In general, prior research has indicated that investment banks may require their analysts to write highly optimistic reports on current and potential future customers to attract lucrative corporate finance business, such as from securities underwriting, merger and acquisition advising, etc. (Dugar and Nathan, 1995; Lin and McNichols, 1998). Besides, financial analysts may be under pressure to produce bullish research reports to stimulate stock trading in order to generate additional brokerage commissions for their employers (Agrawal and Chen, 2004; Cowen *et al.*, 2006). In a lot of countries, including China, (some) investors face short-selling constraints such that pessimistic research reports cannot produce the same trading volumes as optimistic reports. Analysts may also spread favourable opinions on the firms they cover to keep/develop a good relationship with firm management, so as to ease their access to valuable information about the firm (Das and Saudagaran, 1998; Lim, 2001).

[39] Two other rankings of financial analysts exist: *Sky Eye* and *21Century*. Both started after 2004 and have only limited influence.

However, if the above incentives are the *only* incentives that affect the behavior of financial analysts, we may not observe any differences between the EPS forecasts of affiliated vs. non-affiliated analysts. As Mehran and Stulz (2007) point out, with or without an underwriting relationship, the wish to generate future business and/or to develop/maintain a good relationship with firm management exist equally among affiliated and non-affiliated financial analysts. For example, regardless of whether investment banks have established a *prior* relationship with a listed firm, banks need to compete for *future* corporate finance and trading business and, thus, may wish to please firm managers by inciting their financial analysts to release highly favorable research reports. So, in order to attract future investment banking business, financial analysts who are not affiliated with the IPO lead manager have no smaller incentives to release a positively biased advice than affiliated analysts do. As Ramnath *et al.* (2008) point out, more research is needed to answer what is *special* about the IPO underwriting relationship and how that relationship might affect the earnings forecasts released by affiliated analysts.

To answer this question, we first need to clearly identify those affiliated analysts. Following prior research (e.g., Lin and McNichols, 1998; Michaely and Womack, 1999, Jacob *et al.*, 2008), we define an *affiliated analyst* as a financial analyst who is employed by the IPO firm's *lead* manager at the time of listing. As Michaely and Womack (1999) argue, the IPO lead manager plays the most important role in an IPO. First, the IPO lead manager performs the due diligence on the issuing firm and, hence, financial analysts employed by that lead manager may obtain more accurate information as to the issuer. Second, the IPO lead manager typically takes responsibility as to fixing the final offer price and generally offers post-IPO price support (Aggarwal, 2000). In China, the IPO lead manager takes full responsibility to prepare the IPO application documents and to submit the IPO application with the regulator (see also Huyghebaert and Xu, 2013). So, identifying the affiliated financial analysts as the analysts that are employed by the IPO lead

manager seems the most natural way to explore how the IPO underwriting relationship affects the EPS forecasts of affiliated financial analysts.[40]

We put forward three potential explanations as to *how* and *why* the IPO underwriting relationship might influence the EPS forecasts released by affiliated financial analysts. We also develop testable hypotheses in order to examine their empirical validity.

First, Eccles and Dwight (1988) point out that within investment banks, in order to share expertise and to reduce costs, the corporate finance department and the research department often work closely together in IPOs.[41] An investment bank's view on an IPO firm is thus largely determined by the view of its financial analysts as to the issuer. Listing candidates, when chosing their IPO underwriter(s) in a *beauty contest*, will consider the contract terms that various investment banks are willing to offer (Lin and McNichols, 1998). Investment banks that value the issuer more highly are more inclined to endorse a higher offer price and to accept a lower IPO fee rate. Correspondingly, the investment bank(s) that hold a more optimistic view about the IPO firm are more likely to obtain the IPO underwriting mandate, *ceteris paribus*. Because of such a self-selection effect, affiliated analysts may thus truly hold a more optimistic view on issuing firms than non-affiliated analysts do. Correspondingly, affiliated analysts may also release more positive earnings forecasts on IPO firms, without an *intention* to bias their forecasts. In the rest of the paper, we call this view the 'analyst-optimism view'. If the analyst-optimism view holds true, we should observe that with or without incentives to support the issuer's stock price in the aftermarket, affiliated analysts *always* release more positive EPS forecasts than non-affiliated analysts do. The

[40] For all earnings forecasts in our sample, 2,076 are issued by a financial analyst employed by the IPO lead manager, while only 106 are released by a financial analyst employed by an IPO co-underwriter. In the main test, we classify the financial analysts employed by co-underwriters as non-affiliated financial analysts; in an unreported robustness test, we excluded the EPS forecasts of co-underwriter analysts and find that results do not change.

[41] However, in the 2003 Great Settlement between the SEC and the top-ten U.S. investment banks, the SEC demanded a clear separation between the corporate finance department and the research department in investment banks (SEC release 2003-54). Correspondingly, affiliated analysts in the U.S.A. are now forbidden to participate in 'pitches' and 'road shows' in IPOs and to receive compensation that relates to the investment bank's corporate finance business. The new regulation does not prohibit those analysts to do research on the companies that will issue new shares. Those affiliated analysts can thus still value IPO candidates and share their research results with internal and external clients. Moreover, during our sample period, the Chinese regulator never forbade sharing services between an investment bank's corporate finance department and its research department.

regulatory change of June 10, 2009 should thus not have engendered any changes in the (potential) gap between the EPS forecasts of affiliated vs. non-affiliated financial analysts; we henceforth call this gap the *relative bias*. Moreover, under the analyst-optimism view, this relative bias should not be associated with the issuer's stock price in the aftermarket. Affiliated analysts should thus not release more positively biased EPS forecasts when the issuer's stock price dropped after the firm's first listing. As Michaely and Womack (1999) point out, the change in the aftermarket stock price should bear no relation with the relative optimism of affiliated analysts compared to non-affiliated analysts. So, if it is the optimism of affiliated analysts (relative to non-affiliated ones) that provokes a relative forecast bias for affiliated analysts, the difference in EPS forecasts between affiliated and non-affiliated analysts should be uncorrelated with the aftermarket stock price, no matter before or after the regulatory change. We postulate the following hypothesis:

Hypothesis 1: If the analyst-optimism view is true:

1A. The earnings forecasts released by affiliated financial analysts should be more positively biased than the forecasts of non-affiliated analysts, regardless of whether the firm became listed before or after June 10, 2009.

1B. The positive relative bias in earnings forecasts should not be associated with the issuer's stock price movement in the aftermarket, regardless of whether the firm became listed before or after June 10, 2009.

Second, Jacob *et al.* (2008) suggest that by performing the due diligence on the IPO firm, financial analysts affiliated with the IPO lead manager typically obtain a better understanding about the IPO firm than non-affiliated analysts do. Moreover, by IPO underwriting, lead managers also establish a close relationship with firm management. This relationship may subsequently benefit the investment bank's research department, by giving its financial analysts access to timelier and more accurate information about the issuer after its stock market listing. Using U.S. data from 1995

to 2003, Jacob *et al.* (2008) find that affiliated financial analysts release more accurate forecasts than non-affiliated analysts do. Surely, forecast accuracy does not equal forecast bias.[42] However, it is not unreasonable to assume that when enjoying an information advantage, affiliated financial analysts better understand the issuer's true quality and, thus, can base their forecasts more on the company's fundamentals. Correspondingly, we can expect that the forecast errors made by affiliated financial analysts, if any, will be small and random, i.e. not in one direction. In contrast, non-affiliated financial analysts, because of their lack of precise information, may base their forecasts more on personal judgment, which could be subject to prevailing market conditions. As a result, they could exhibit positive forecast errors in times of bullish stock markets and negative forecast errors when stock market conditions are bearish (e.g., Bergman and Roychowdhury, 2008; Walther and Willis, 2013). We therefore contend that affiliated analysts may offer not only more accurate, but also less biased forecasts than non-affiliated analysts do. We call this view the 'information-advantage view'.

As the information advantage enjoyed by affiliated financial analysts arises from their close contacts with firm management, and those contacts are unlikely to be affected by the regulatory change of June 10, 2009, we expect that the affiliated analysts' information advantage – if any – will be as strong before as after the regulatory reform. Hence, if affiliated analysts issue less biased and more accurate EPS forecasts because of an information advantage, we can expect this behavior to hold, regardless of whether the firm became listed before or after June 10, 2009. In sum, we put forward the following hypothesis:

Hypothesis 2: If the information-advantage view is true:

2A: The earnings forecasts released by affiliated financial analysts should be less biased than the earnings forecasts of non-affiliated analysts, regardless of whether the firm became listed before or after June 10, 2009.

[42] An analyst who makes big but random errors issues less biased forecasts than an analyst who constantly makes small but positive forecast errors. However, in terms of forecast accuracy (no matter whether it is measured by the mean squared error or by the absolute error), the former analyst is less accurate than the latter.

2B: The earnings forecasts released by affiliated analysts should be more accurate than the earnings forecasts of non-affiliated analysts, regardless of whether the firm became listed before or after June 10, 2009.

Third, Aggarwal (2000) points out that the IPO underwriting contract between issuers and their investment banks could explicitly foresee in post-IPO price support, typically during the first 30 days after listing. Then, the IPO lead manager actually engages in a contract that imposes some obligations on it. Moreover, Ljungqvist *et al.* (2006) emphasize that it takes time for institutional investors to sell out their initially allocated IPO shares. If the issuer's stock price declines too fast after the IPO, those institutional investors may incur a loss on their initial investment in IPO shares. When the IPO offer price is ultimately set by the IPO lead manager, institutional investors could blame that investment bank for having set the issue price too high and, thus, lose their interest to participate in any future IPOs organized by this same investment bank. Likewise, firms considering an IPO may no longer want their offering to be underwritten by an investment bank that has proved unable to fix IPO offer prices. So, investment banks may wish to provide post-IPO price support shortly after the firm's first listing, particularly when the firm's stock price dropped in the aftermarket. In this sense, the pressure to offer post-IPO price support can positively influence affiliated analysts' EPS forecasts relative to those of non-affiliated analysts. In the rest of the paper, we call this view the 'post-IPO price-supporting view'.

To examine this post-IPO price-supporting view, it would be ideal if we could randomly assign price-supporting incentives to certain financial analysts and take away those incentives from others. In real life, we do not have the luxury to set up such an experiment. However, we argue that the regulatory change of June 10, 2009 created – for the first time – strong incentives for IPO lead managers in China to offer post-IPO price support. Lewellen (2006) points out the existence of two rationales underlying post-IPO price support: to reward primary-market investors for revealing their private information and, thus, help investment banks to properly price the offering and/or to

disguise IPO overpricing if the underwriter priced the offer too high. Obviously, the pre-condition for both motivations to exist is that the IPO offer price should be set (at least in part) by IPO underwriters. Without this pre-condition, investment banks take no responsibility as to the offer price and, thus, have no specific reason to provide price support in the aftermarket. As already pointed out in Section 3.2, investment banks in China had only little to say about IPO offer prices before the regulatory change. So, when an issuer's stock price dropped in the aftermarket, primary-market investors were unlikely to blame underwriters for having priced the IPO too high. Moreover, the huge first-day abnormal return (87%) and the small likelihood of the aftermarket price dropping below the IPO offer price (15.7%) made post-IPO price support less necessary. In contrast, investment banks obtained a more prominent role in fixing IPO offer prices after the regulatory change. Also, IPO underwriters – as specialists and repetitive participants in the IPO market – could be held responsible by primary-market investors once the issuer's stock price dropped shortly after the IPO. If primary-market investors, especially the large institutional ones who repetitively participate in IPOs and who invest considerable amounts, would incur such losses in the aftermarket, they could blame the IPO lead manager for having set the IPO offer price too high. Consequently, they may lose interest to participate in any future IPOs organized by this same investment bank. Losing the attention of institutional investors is problematic for an investment bank, as those investors play a crucial role in the bookbuilding process by providing their tentative price indications when the final IPO offer price is to be set. Some scholars even argue that an investment bank's network of institutional investors is its most valuable asset (Eccles and Dwight, 1988; Morrison and William, 2007). Arguably, after June 10, 2009, IPO lead managers obtained strong incentives to maintain issuer stock prices sufficiently high after the firm's first listing to allow primary-market investors, especially their institutional clients, to realize a positive return on their initially allocated shares. As the green-shoe mechanism has been used only rarely in Chinese domestic IPOs, investment banks may have relied upon positively biased investment recommendations and EPS forecasts to provide such post-IPO price support. We therefore expect

financial analysts affiliated with the IPO lead manager to issue more positively biased earnings forecasts than non-affiliated analysts *only* after the regulatory change. We also expect this price-supporting incentive to be stronger in the 90 days after first listing, which is when institutional investors face a lock-up period for their initially allocated IPO shares. The other direct implication of the post-IPO price-supporting view is that affiliated analysts' EPS forecasts should become even more positively distorted when the issuer's stock price drops in the aftermarket.

Next, under the price-supporting view, we expect that affiliated financial analysts may bias especially their forecasts on future-year EPS rather than on current-year EPS in order not to harm their reputation too much among investors. Financial analysts indeed usually release forecasts on the annual EPS of IPO firms for different fiscal years after the firm's first listing. For example, forecasts issued on March 1, 2009 may relate to the annual EPS for fiscal years 2009, 2010, 2011 or even further. As Lin and McNichols (1998) and Bessler and Stanzel (2009) point out, more information becomes available on the issuer as time reaches the end of the forecast horizon. Correspondingly, it becomes harder to continue distorting forecasts without alarming investors. Moreover, if affiliated financial analysts wish to disguise their post-IPO price-supporting incentives, they should not distort their forecasts on current-year EPS too much compared to those of non-affiliated financial analysts. Otherwise, their post-IPO price-supporting intention can be easily detected by stock market investors once the firm announces its realized EPS. However, they can still release more positively biased EPS forecasts for future years and adjust these forecasts slowly over time, as the end of the forecast horizon approaches. When future-year EPS realizes, investors, especially retail ones, may not even remember what affiliated analysts forecasted shortly after the IPO. Thus, a largely biased forecast on future-year EPS tends to be less harmful to the reputation of affiliated analysts than a largely biased forecast on current-year EPS. Hence, we expect that affiliated analysts will prefer distorting their forecasts on future-year EPS when facing incentives to provide post-IPO price support. So, if the post-IPO price-supporting view is true, the

relative bias for affiliated analysts should be bigger for the future-year EPS forecasts than for their current-year EPS forecasts.

In sum, using the change in regulation as a natural experiment to examine the post-IPO price supporting view, we put forward the following hypothesis:

Hypothesis 3: If the post-IPO price-supporting view is true:

3A. For the firms listed before June 10, 2009, the earnings forecasts released by affiliated financial analysts are no more positively biased than the forecasts of non-affiliated analysts.

3B. For the firms listed after June 10, 2009, the earnings forecasts of affiliated financial analysts are more positively biased than the forecasts of non-affiliated analysts. This relative bias is stronger in the 90-day lock-up period and when the issuer's stock price dropped relative to the issue price in the aftermarket. Morever, affiliated analysts will bias especially their future-year forecasts rather than their current-year forecasts.

The three views we propose are not mutually exclusive. An affiliated analyst who holds an optimistic view as to an IPO firm can also obtain access to more accurate information about the issuer during the process of IPO underwriting and, at the same time, be required by his employer (the IPO lead manager) to provide post-IPO price support for the issuer. However, a fundamental difference between the post-IPO price-supporting view and the other two views is that the post-IPO price-supporting view assumes that analysts *intentionally* distort their forecasts, while the other two views presume that analysts report their forecasts *honestly*. It is here that the regulatory change of June 10, 2009 can help to identify what is driving the bigger relative forecast bias of affiliated analysts, if any, in the context of IPO underwriting. Indeed, this regulatory change affected neither affiliated analysts' relative optimism nor their access to information, but likely has hugely influenced their incentives.

So, we rely on the regulatory change of June 10, 2009 as a natural experiment to examine our three conjectures. When using a real-life event as natural experiment, researchers always face a concern about whether the results from the experiment are really exogenous to the event itself. We contend that this is indeed the case in the context of the regulatory change that we examine. The purpose of the June 10, 2009 reform was to improve the market mechanism in the primary market; analyst behavior in the secondary market clearly was not an issue in this reform. Actually, nothing was said about financial analysts in the 'The guiding advice on further reform of the IPO pricing method' published by the CSRC on June 10, 2009. So, this reform can be considered as an exogenous shock for financial analysts and their investment advice. If we divide Chinese analysts' EPS forecasts into two groups, those for the IPOs initiated before June 10, 2009 and those for the IPOs after June 10, 2009, we can compare the forecasts of affiliated financial analysts with those of non-affiliated analysts in these two time frames. The results should inform us about the applicability of the analyst-optimism view, the information-advantage view, and the price-supporting view. This experiment opportunity is unique. To the best of our knowledge, IPO underwriters indeed have always taken full responsibility as to IPO offer prices in any other major market, thereby provoking strong post-IPO price-supporting incentives.

3.4. Empirical examination

3.4.1. Data and methodology

3.4.1.1. Data collection

We relied on the CSMAR database to collect the annual earnings forecasts on the firms that became publicly listed in Mainland China between 2004 and 2011. For each of these firms, we downloaded its annual EPS forecasts released in the year following its IPO, by affiliated as well as non-affiliated financial analysts.[43] In our article, we identify an *affiliated* financial analyst as an analyst employed

[43] In the U.S.A., affiliated analysts cannot release any investment recommendations and earnings forecasts in the 40 to 90 days after first listing (the 'quite period'). However, this regulation is non-exist in China during our sample period. So, in our analysis, we use all forecasts released in the first year after the IPO.

by the issuer's lead manager in the IPO. Our sample period for EPS forecasts is thus from Jan. 1, 2004 to Dec. 31, 2012. All EPS forecasts relate to the company's *annual* earnings rather than to its *quarterly* earnings, given that the latter forecasts are only scarcely published in China. We decided to limit our sample to the forecasts issued in the year following the firm's first listing, as is a typical approach in the literature (see Michaely and Womack, 1999; James and Karceski, 2006; Ljungqvist *et al.*, 2007). This restriction is indeed important, as other corporate finance activities – e.g., SEOs, M&As – may take place if the post-IPO period over which the forecasts are issued is extended for too long. Then, researchers may find it difficult to set up a clear test on the effects of the IPO underwriting relationship. Moreover, both the information advantage obtained in IPO underwriting and post-IPO price-supporting incentives tend to diminish as time lapses after the IPO. So, we use the forecasts released in the first listing year in all analyses hereafter.[44] Nonetheless, some of the forecasts may relate to the EPS of the listing year, while others may involve the EPS in the second or third year after IPO. The latter feature of our dataset is interesting, as it enables us to compare forecasts across different forecast horizons. From 2004 to 2011, 969 issuers (88% of the total number of IPO firms) were followed by at least one financial analyst in their first listing year, 319 firms in the subperiod of 2004–June 9, 2009 and 650 firms in the subperiod of June 10, 2009–2011. In total, 1,627 analysts employed by 90 investment banks/brokerage firms released 36,885 earnings forecasts on these firms in the first year after IPO.

Next, following prior research (e.g., Lin and McNichols, 1998; Jacob *et al.*, 2008), we further restrict our sample to the IPO firms that were followed by at least one *affiliated* financial analyst. For the 969 IPO firms on which we have analyst coverage data released during the first post-IPO year, 384 firms (39.6% of the sample) were covered by at least one financial analyst employed by the firm's IPO lead manager, containing 80 firms in the first subperiod (25% of the sample) and 304 firms in the second subperiod (46.9% of the sample). As a result, our final sample reduces to 21,499 earnings forecasts, i.e. 58.3% of the total number of 36,885 EPS forecasts. Arguably, the

[44] In a non-reported robustness test, we used forecasts released in the two years after IPO; results prove similar as when using the one-year time frame.

IPO firms in our sample are amongst the most widely followed issuers. On average, an issuer in our sample is followed by 10 financial analysts (median of 8). Anyway, as the decision of the IPO lead manager to cover an issuer by means of financial research is not a random one, this sample selection criterion may engender a potential sample selection bias. We therefore adopt a Heckman (1976) two-step regression model to deal with this potential problem.

Following Bessler and Stanzel (2009) and Bartholdy and Feng (2013), we define the forecast error ($FE_{j,i,t}$) as: ($FEPS_{j,i,t} - AEPS_{i,t}$) / $|AEPS_{i,t}|$, where $FEPS_{j,i,t}$ is the forecast of earnings per share by analyst *j* on firm *i* for year *t*. $AEPS_{i,t}$ is the reported earnings per share by firm *i* for year *t*. We define forecast accuracy ($FA_{j,i,t}$) as the absolute value of $FE_{j,i,t}$.[45] So, a bigger $FA_{j,i,t}$ means a less accurate forecast. We winsorize *FE* at 5% and 95% and *FA* at 95% to remove outliers.[46] Table 3.1 reports summary statistics on the forecast error and forecast accuracy variables. Over the full-sample period, the forecasted earnings per share is on average 130% *bigger* than the reported EPS number (median of 40%). We further notice that in both subperiods, the earnings forecasts released by affiliated as well as non-affiliated financial analysts are severely positively biased. *t*-tests and Wilcoxon rank-sum tests confirm that the average and median forecast error are significantly larger than zero in both subperiods. Next, Table 3.1 reveals that the mean and median forecast errors in the first subperiod are 1.129 and 0.165; in the second subperiod, they reach 1.335 and 0.540, both significantly bigger than in the first subperiod.. Similar patterns arise as to forecast accuracy: the magnitude and significance level of the mean and median FA are quite similar to those of FE. We note that only 3,843 out of the 21,499 EPS forecasts (17.8% of the sample) turn out smaller than the actually reported EPS number, which renders the statistics on *FE* and *FA* highly comparable. Arguably, throughout the sample period, analysts in Chinese domestic stock markets did not

[45] We follow the financial analysts literature to define forecast accuracy in this way (e.g., Jackson 2005; Jacob *et al.*, 2008; Fang and Yasuda, 2009). However, we also calculated the mean squared forecast error to measure forecast accuracy in an unreported robustness check. Results prove similar to those reported in the paper.

[46] We also winsorized the data at 1% and 99%; results prove similar. There is no need to censor *FA* at the left-hand side of its distribution, as *FA* by nature is limited to zero at the lowest level.

correctly forecast the firms' earnings per share and their EPS forecasts were, on average, severely positively biased.

We also notice that in both subperiods, the mean/median *FE (FA*) of affiliated analysts are significantly bigger than those of non-affiliated analysts. However, forecast error and forecast accuracy are influenced by other factors such as firm characteristics and forecasting horizon. To making a better comparison between affiliated and non-affiliated analysts' forecasts, we should further control for firm characteristic and for reporting horizon. We compare the forecast errors of affiliated and non-affiliated financial analysts by IPO firm. So, for every issuer, we compare the average forecast error on EPS for the same year by affiliated and non-affiliated financial analysts. This test should allow us to control for individual firm-specific characteristics that may potentially influence the forecasts of financial analysts. Suppose two affiliated analysts and two non-affiliated analysts follow firm A; each of them releases a forecast on the EPS of the IPO year and a forecast on the EPS of the year after IPO. We subsequently calculate the average of the forecast errors made by the two affiliated analysts; we do this separately for the EPS of the IPO year and for the EPS of the year after IPO. We next subtract the corresponding average forecast error of the two non-affiliated analysts to obtain the *relative bias* in the IPO year and in the year thereafter. We repeat this same procedure for all 384 IPO firms in our sample. Table 3.2 reports summary statistics on this relative bias for the firms becoming listed from 2004 to June 9, 2009 and for the firms becoming listed from June 10, 2009 to 2011. For each subperiod, we further divide the forecasts into those for the IPO year (*IPO year*) and those for the fiscal years thereafter (*Future years*). We use a *t*-test and a Wilcoxon rank-sum test to examine whether or not the average and median relative bias equal zero. Before June 10, 2009, the average and median relative bias are not significantly different from zero. However, after the regulatory change, the average and median relative bias do become significantly positive. This outcome thus indicates that the regulatory change has incited affiliated financial analysts to produce more positively distorted EPS forecasts than non-affiliated analysts do. Interestingly, we also find that the significantly positive relative

bias after June 10, 2009 arises from the EPS forecasts for years after the IPO year. As the EPS forecasts included in our sample were all issued in the first year after listing, this finding thus suggests that affiliated financial analysts may strategically distort their forecasts on future-year EPS rather than on current-year EPS, in order to mask their self-interested post-IPO price supporting behavior.

3.4.1.2. The regression model on FE and FA

Next, we perform multivariate analyses to compare the forecast error and forecast accuracy across affiliated and non-affiliated financial analysts, in both subperiods. For that purpose, we run OLS regressions using *FE* and *FA* as dependent variables in order to identify the affiliated-analyst effect. As to the explanatory variables, we create a dummy equal to one if the earnings forecast is from an analyst who is employed by the issuer's IPO lead manager, and zero otherwise (*Affiliated dummy*). The coefficient on this dummy should thus capture whether affiliated financial analysts are associated with a bigger forecast error (or better forecast accuracy) than non-affiliated analysts, everything else constant. Like James and Karceski (2006), we also construct a variable to capture the issuer's stock price in the aftermarket relative to the IPO offer price (*Relative price*). That is, we subtract the offer price from the stock's closing price at the day before the forecast is released and divide it by the offer price at IPO. From the primary-market investors' point of view, *Relative price* thus captures how much they have gained (lost) from having bought one IPO share at the offer price up till the day before the forecast is released. To examine whether the positive relative bias of affiliated financial analysts increases when the issuer's stock price dropped considerably below the IPO offer price in the aftermarket (*Hypotheses 1B and 3B*), we generate an interaction term between *Affiliated dummy* and *Relative price*.

Table 3.1
Summary statistics on forecast error and forecast accuracy

In this table, we present summary statistics on forecast error ($FE_{i,j,t}$) and forecast accuracy ($FA_{i,j,t}$). $FE_{,j,i,t}$ is defined as ($FEPS_{j,i,t} - AEPS_{i,t}$) / $|AEPS_{i,t}|$, where $FEPS_{j,i,t}$ is the forecast of earnings per share on firm *i* in year *t* by analyst *j*. $AEPS_{i,t}$ is the reported earnings per share by firm *i* for year *t*. *FE* is winsorized at 95% and 5%, while *FA* is winsorized at 95%. All forecasts are released in the first year after IPO.

Period	Type of analysts	Number of earnings forecasts	Mean FE	Median FE	Min FE	Max FE	*p*-value *t*-test	*p*-value Wilcoxon test	Mean FA	Median FA	Min FA	Max FA	*p*-value *t*-test	*p*-value Wilcoxon test
2004–June 9, 2009	Affiliated analysts	360	1.5942	0.2043	-0.2996	7.6345	<0.0001	<0.0001	1.6520	0.2043	0	7.6410	<0.0001	<0.0001
	Non-affiliated analysts	3,209	1.0567	0.1517	-0.2996	7.6345	<0.0001	<0.0001	1.1254	0.2187	0	7.6410	<0.0001	<0.0001
	Total	3,569	1.1289	0.1650	-0.2996	7.6345	<0.0001	<0.0001	1.1972	0.2197	0	7.6410	<0.0001	<0.0001
June 10, 2009–2012	Affiliated analysts	1,744	1.6143	0.7142	-0.2996	7.6345	<0.0001	<0.0001	1.6716	0.7142	0	7.6410	<0.0001	<0.0001
	Non-affiliated analysts	16,186	1.2867	0.5228	-0.2996	7.6345	<0.0001	<0.0001	1.3465	0.5228	0	7.6410	<0.0001	<0.0001
	Total	17,930	1.3354	0.5398	-0.2996	7.6345	<0.0001	<0.0001	1.3956	0.5398	0	7.6410	<0.0001	<0.0001
2004–2012	Affiliated analysts	2,104	1.6108	0.6823	-0.2996	7.6345	<0.0001	<0.0001	1.6682	0.6823	0	7.6410	<0.0001	<0.0001
	Non-affiliated analysts	19,395	1.2486	0.3809	-0.2996	7.6345	<0.0001	<0.0001	1.3099	0.3809	0	7.6410	<0.0001	<0.0001
	Total	21,499	1.3012	0.4012	-0.2996	7.6345	<0.0001	<0.0001	1.3626	0.4012	0	7.6410	<0.0001	<0.0001

Table 3.2
Comparison of forecast errors by affiliated and non-affiliated analysts on the same IPO firm

In this table, we present summary statistics for the comparison of the forecast error across affiliated and non-affiliated financial analysts (relative bias). We summarize earnings forecasts by firms and by fiscal years. For the same firm and same fiscal year, we subtract the average forecast error made by non-affiliated analysts from the average forecast error made by affiliated analysts to obtain the *relative bias*. We split the full sample into the period before June 10, 2009 and the period after June 10, 2009. In each subperiod, we further divide the sample into the forecasts on EPS of the IPO year (*IPO year*) and the forecasts on EPS of fiscal years after the IPO year (*Future years*). We use a *t*-test and a Wilcoxon rank-sum test to examine the null hypothesis that the mean and median relative bias equal zero, respectively. We report the *p*-values of these two tests in the last two columns of the table.

Period	**Fiscal year**	**Number of observations**	**Mean relative bias**	**Median relative bias**	**Standard deviation**	**Min**	**Max**	***p*-value *t*-test**	***p*-value Wilcoxon test**
2004–June 9,2009	IPO year	23	0.0390	0.0192	0.4715	-0.5740	0.9621	0.4719	0.8282
	Future years	76	-0.0061	0.0053	0.3644	-0.9721	1.0530	0.8787	0.3752
	Total	99	0.0044	0.0092	0.3429	-0.9721	1.0530	0.8842	0.4527
June 10, 2009–2012	IPO year	153	0.0180	0.0020	0.2891	-1.0320	2.6064	0.4394	0.7195
	Future years	347	0.2141	0.0511	1.4622	-5.0573	6.2486	0.0077	0.0200
	Total	500	0.1540	0.0132	1.2210	-5.0573	6.2486	0.0031	0.0531

As the literature has shown that EPS forecast errors can be influenced by many other factors, we include a number of control variables. First, we account for the reputation of the financial analyst by means of a dummy variable that equals one if the analyst is included in the star analyst list of *New Fortune* in the year before the forecast was released, and zero otherwise (*Analyst ranking*). Jackson (2005) and Fang and Yasuda (2009) argue that reputation is extremely important to financial analysts and, thus, may help them to resist conflicts of interest. To better separate analyst reputation from analyst experience, we also include the total number of forecasts, on IPO firms as well as on already-listed firms, released by the financial analyst till the forecast under consideration (*Analyst experience*). The first forecast in our database is from 2001; so, we obtained the variable *Analyst experience* by counting all forecasts made by a certain financial analyst from 2001 to the forecast under consideration. We subsequently take the log of one plus this total number of forecasts. Second, reputation concerns by the investment bank that employs the financial analyst could also help to mitigate conflicts of interest. So, in line with Fang and Yasuda (2009), we further include the investment bank's market share in IPO underwriting in the year before the forecast was released (*Market share*). The market share of investment bank *i* in year *t* is calculated by dividing the total gross proceeds of the IPOs in which bank *i* served as lead manager in year *t* by the total gross proceeds raised in all IPOs in year *t*.[47] As some investment banks may focus their business model on providing valuable research coverage, they may employ a larger team of financial analysts. Those investment banks may then also care more about the reputation of their financial analysts and, hence, ensure that their analysts are able to provide independent research coverage. We therefore control for the total number of financial analysts employed by the analyst's investment bank at the start of the forecasting year (*Number of analysts*).

Next, we control for a number of issuer-specific characteristics. We include three variables relating to the firm's equity-issuing activities: the fee rate that the firm paid to its investment bank(s) for its IPO (*Fee rate*), the first-day abnormal return on its IPO (*Abnormal return*), and a

[47] We also used the average market share of investment bank *i* in years *t*, *t-1* and *t-2*, but find that results do not change.

dummy that indicates a seasoned equity offering(s) in the three years following the IPO (*SEO dummy*). The issuer that paid a larger fee rate for its IPO might also be prepared to pay more fees in future corporate finance transactions. Hence, affiliated as well as non-affiliated financial analysts could produce more positively biased EPS forecasts to compete for future business with this firm. Conversely, when IPO underwriters underprice the offering to a larger extent, thereby allowing for a bigger first-day abnormal return, this might reflect that the IPO is surrounded by more uncertainty (Beatty and Ritter, 1986; Rock, 1986). The first-day abnormal return might then also correlate positively with our *FA* variable. The *SEO dummy*, which equals one if the IPO firm made a seasoned equity offering (SEO) in the three years after IPO, and zero otherwise, might be positively correlated with *FA*. This will be the case when investment banks compete for future corporate finance business by means of positively distorted earnings forecasts.[48] With this specification, we thus assume that investment banks in general are able to anticipate whether or not an IPO firm will implement a SEO after its stock market quotation.

Next, as the IPO literature has shown that larger firms have more stable earnings, the earnings of those firms may be easier to forecast. Besides, bigger firms may also release more information. So, we add the log of the issuer's total assets at the end of the pre-IPO year (*Assets*). We further include a dummy equal to one if the Chinese state controls more than 50% of the firm's direct and indirect voting rights before the IPO, and zero otherwise (*SOE dummy*). Private owners may care more about their firm's stock price in the aftermarket than state owners, as they usually have invested a large fraction of their personal wealth in the IPO firm, while state owners hold a much more diversified investment portfolio. On the other hand, as a repetitive player in the IPO market, the state may not like a declining stock price for one of its IPOs either, as this could jeopardize the success of its future privatization IPOs. Moreover, the earnings of SOEs likely are easier to predict, as SOEs have a longer history and usually benefit from some monopoly power in their business

[48] We do not have any data on the IPO firm's M&As nor on the brokerage trading business that an issuer generates for each investment bank. So, we cannot control for the incentives to provide positively biased EPS forecasts to generate these two types of future business for investment banks.

segment(s). Correspondingly, the room left for EPS forecast distortion tends to be smaller, thereby reducing the forecast error for SOEs. In sum, the relation between state ownership and the forecast error is an empirical question.

Finally, Lin and McNichols (1998) and Bessler and Stanzel (2009) find that a forecast that is released much before the end of the fiscal year is associated with a larger positive forecast error. The reason is that when financial analysts intend to positively distort their earnings forecasts, they can do this far more easily without causing any suspicion among investors long before the end of the forecast period, i.e. at a time when annual earnings are still highly uncertain. As the forecast horizon shortens, more information becomes available on the firm and, thus, it becomes harder to continue distorting the forecasts without making investors wary of such distortions and, thus, harming the analyst's reputation. So, we add the *Forecast horizon* in our regression model; it is calculated as the number of days between the release of the forecast and the end of the fiscal year to which the forecasted EPS relates.[49]

To account for potential industry effects, we include *Industry dummies* based on the CSRC industry classification code. We also control for year fixed effects by means of *Year dummies*. We run the same regression model to explain the forecast error (*FE*) and forecast accuracy (*FA*):

$$FE(FA) = C + \beta_1 Affiliated\_dummy + \beta_2 Affiliated\_dummy \times \mathrm{Re}lative\_price + \beta_3 \mathrm{Re}lative\_price + \beta_4 Analyst\_ranking + \beta_5 Analyst\_experience + \beta_6 Market\_share + \beta_7 Number\_of\_analysts + \beta_8 Fee\_rate + \beta_9 Abnormal\_return + \beta_{10} SEO\_dummy + \beta_{11} Assets + \beta_{12} SOE\_dummy + \beta_{13} Forecast\_horizon + \sum_{i=1}^{12} \theta_i Industry\_dummies_i + \sum_{i=1}^{n} \gamma_i Year\_dummies + \varepsilon$$

Table 3.3 presents summary statistics for all variables used in the regressions. Because of missing values on some variables, we were able to retain only 3,098 (86%) out of 3,596 forecasts in

[49] Firms do not declare their EPS immediately at the end of their fiscal year. In China, the audited annual report is released in March or April. It would be ideal to obtain the official EPS release day to calculate *Forecast horizon*. However, we do not have the data on the exact date of the annual reports release. So, we have to use the end of the fiscal year to calculate *Forecast horizon*.

the first subperiod and 12,838 (72%) out of 17,903 forecasts in the second subperiod. However, the average and median *FE* and *FA* of the dropped-out forecasts are not significantly different from those for the retained forecasts. When comparing the variables in the two subperiods, we find that *Relative price* and *Abnormal return* are much lower in the second subperiod. In the first subperiod, the average *Relative price* is about 100%, while it equals only 30% in the second subperiod. The average first-day abnormal return equals 87.6% in the first subperiod, while it is only 28.8% in the second subperiod. The declining values of *Relative price* and *Abnormal return* may indicate that the value of post-IPO price support has become much more important over time. Table 3.3 also shows that 82.6% of IPO firms are state-owned in the first subperiod, while this fraction drops to 22.6% in the second subperiod. Table 3.4 reports the correlations among all explanatory variables; most correlations are below 0.1. The highest correlation arises between *Assets* and *SOE dummy* (0.68), in the first subperiod.

Table 3.3
Summary statistics for the variables used in the regressions

This table reports summary statistics on all variables used in the forecast-error and forecast-accuracy regressions. In Panels A and B, the summary statistics cover the two subperiods: 2004–June 9, 2009 and June 10, 2009–2012, respectively. *FE* is the forecast error, *FA* is forecast accuracy. *Affiliated dummy* equals one if the forecast is issued by an analyst affiliated with the IPO lead manager, zero otherwise. *Relative price* is calculated by subtracting the IPO offer price from the aftermarket stock price on the day before the forecast is released, divided by the IPO offer price. *Analyst ranking* equals one if the analyst is ranked as a star analyst in the list of *New Fortune* in the year before the forecast is released. *Analyst experience* is the log of one plus the total number of forecasts issued by the analyst before the current EPS forecast. *Market share* is the market share of the analyst's investment bank in IPO underwriting in the previous year. *Number of analysts* is the total number of analysts employed by the investment bank at which the analyst works at the beginning of the current year. *Fee rate* is the IPO fee rate (underwriting fee plus sponsor fee) charged by the lead manager in the firm's IPO. *Abnormal return* is the first-day abnormal return calculated as (first-day closing price – offer price)/ offer price – first-day market return. *SEO dummy* equals one if the IPO firm makes a seasoned equity offering in the three years after listing. *Assets* is the log of total assets before IPO. *SOE dummy* equals one if the state controls more than 50% of the firm's direct and indirect voting rights before the IPO, zero otherwise. *Forecast horizon* is the number of days between the release of the forecast and the end of the forecast period.

Panel A: 2004–June 9, 2009

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
FE	3,098	1.0804	0.1521	2.0964	-0.2996	7.6345
FA	3,098	1.1518	0.2295	4.8815	0.0000	7.6410
Affiliated dummy	3,098	0.0881				
Relative price	3,098	1.0043	0.6392	1.3795	-0.6193	11.5296
Analyst ranking	3,098	0.1094				
Analyst experience	3,098	3.7912	4.1700	1.1889	0.0000	6.6800
Market share	3,098	0.0814	0.0132	0.0996	0.0000	0.3345
Number of analysts	3,098	34.9435	34.0000	16.4920	3.0000	86.0000
Fee rate	3,098	0.0222	0.0180	0.0128	0.0075	0.0741
Abnormal return	3,098	0.8761	0.7781	0.6022	-0.0123	3.7934
SEO dummy	3,098	0.2541				
Assets	3,098	24.5726	25.6861	3.0831	18.7133	29.4966
SOE dummy	3,098	0.8260				
Forecast horizon	3,098	511.4078	484.0000	375.9846	-35.0000*	1929.0000

Panel B: June 10, 2009–2012

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
FE	12,838	1.3474	0.5301	1.9974	-0.2996	7.6345
FA	12,838	1.4023	0.5681	3.2071	0.0000	7.6410
Affiliated dummy	12,838	0.0986				
Relative price	12,838	0.3042	0.1731	0.4864	-0.5800	4.8422
Analyst ranking	12,838	0.1558				
Analyst experience	12,838	5.3601	5.2900	1.1871	0.0000	8.3101
Market share	12,838	0.0542	0.0392	0.0636	0.0000	0.3438
Number of analysts	12,838	40.5027	38.0000	19.9458	1.0000	92.0000
Fee rates	12,838	0.0462	0.0450	0.0187	0.0082	0.1330
Abnormal return	12,838	0.2875	0.2251	0.3182	-0.1864	1.8101
SEO dummy	12,838	0.0991				
Assets	12,838	20.8798	20.3457	1.9237	18.3506	29.8148
SOE dummy	12,838	0.2260				
Forecast horizon	12,838	372.5381	338.0000	266.2988	-28.0000*	1218.0000

* As Chinese firms publish their audited financial statements in March or April of the subsequent year, forecasts can still be made after the end of the forecast period.

Table 3.4
Correlation among explanatory variables

This table reports the correlation among the explanatory variables used in the forecast-error and forecast-accuracy regressions. Those variables are defined in Table 3.3. In Panels A and B of the table, the summary statistics cover the two subperiods: 2004–June 9, 2009 and June 10, 2009–2012, respectively.

Panel A: 2004–June 9, 2009

	Affiliated dummy	Relative price	Analyst ranking	Analyst expe-rience	Market share	Number of analysts	Fee rate	Abnormal return	SEO dummy	Assets	SOE dummy
Relative price	0.0149										
Analyst ranking	0.1020	-0.0647									
Analyst experience	0.0137	-0.2069	0.1978								
Market share	-0.0117	-0.1282	0.0377	0.0548							
Number of analysts	0.2223	-0.0966	0.2182	0.1481	-0.0132						
Fee rate	0.1839	0.2905	0.0118	-0.0476	-0.3123	0.0424					
Abnormal return	0.0603	0.1226	0.0878	0.1438	0.058	0.083	0.2594				
SEO dummy	-0.0059	0.182	-0.0922	0.0057	-0.2036	-0.038	-0.0572	-0.1615			
Assets	-0.1837	-0.2762	-0.0338	-0.0636	0.1083	-0.0394	-0.5756	-0.4514	0.2057		
SOE dummy	-0.2066	-0.2836	-0.029	-0.0738	0.2452	-0.0604	-0.5105	-0.3579	0.0855	0.6773	
Forecast horizon	0.0514	-0.0466	-0.0582	0.0975	-0.0694	0.0683	0.2292	0.1455	-0.0838	-0.2464	-0.2628

Panel B: June 10, 2009–2012

	Affiliated dummy	Relative price	Analyst ranking	Analyst expe-rience	Market share	Number of analysts	Fee rate	Abnormal return	SEO dummy	Assets	SOE dummy
Relative price	0.0163										
Analyst ranking	0.0207	0.0112									
Analyst experience	-0.0455	-0.1055	0.4121								
Market share	0.0304	0.261	0.0141	-0.0454							
Number of analysts	0.2376	0.0232	0.1685	0.0475	0.0456						
Fee rate	0.0372	0.0208	-0.0384	0.0751	-0.0703	-0.0533					
Abnormal return	0.0301	0.5954	-0.0107	-0.0736	0.275	0.0233	0.0703				
SEO dummy	-0.0138	0.1433	0.0159	-0.0326	0.1257	0.0358	-0.1262	0.0304			
Assets	-0.0299	-0.2333	0.0557	-0.0327	0.0107	0.0619	-0.6092	-0.2526	0.1358		
SOE dummy	-0.0161	-0.0203	0.0183	-0.0645	0.1547	0.0499	-0.4877	-0.0645	0.1152	0.6194	
Forecast horizon	0.0038	0.1209	0.0066	-0.0607	0.0362	0.0479	-0.1004	0.0678	0.0462	0.0393	0.0725

3.4.1.3. The Heckman (1976) two-step model

In this paper, we are interested in comparing the EPS forecast error and forecast accuracy across affiliated and non-affiliated financial analysts. Following prior research (e.g., Lin and McNichols, 1998; Jacob *et al.*, 2008; Bartholdy and Feng, 2013), we restricted our sample to the IPO firms that are covered by at least one financial analyst employed by the issuer's lead manager in the year after IPO. However, analysts of IPO lead managers may not randomly decide on which firms to follow. So, limiting the sample to the IPO firms that are covered by their lead manager's financial analyst(s) may raise questions as to whether the choice of IPO firm follow-up by affiliated analyst(s) confounds with their forecast error. This problem has been largely ignored in the

literature to date, maybe also because most IPO firms in Western economies are covered by the IPO underwriter's analysts after listing. As an example, Cliff and Denis (2004) point out that 80% of IPO firms becoming listed in the U.S.A. during 1993–2000 are covered by at least one financial analyst employed by the issuer's lead underwriter. However, in China, for the 969 firms on which we have analyst-coverage data in the first post-IPO year, only 384 firms (39.6%) are covered by their IPO lead manager's financial analysts. So, we need to deal with a potential sample-selection bias.

We adopt Heckman's (1976) two-step method to deal with this potential bias. In the first step, we run a probit regression model for the probability that the IPO firm will be covered by an affiliated financial analyst. We set the *Follow-up dummy* equal to one if the IPO firm is followed by at least one financial analyst employed by its IPO lead manager, and zero otherwise.[50] We regress the *Follow-up dummy* on the following variables. First, we include the total number of financial analysts employed by the issuer's lead manager at the beginning of the IPO year (*Underwriter analyst number*). We expect that IPO lead managers employing a larger number of financial analysts are more likely to provide post-IPO research coverage, *ceteris paribus*. Second, we add the issuing P/E ratio, from which we subtract the market P/E ratio at the time of the IPO (*Pricing aggressiveness*).[51] Stocks issued at a higher P/E ratio may need more post-IPO research coverage to sustain a higher price in the aftermarket. We expect this effect to be significant especially in the second subperiod, when the issuing P/E ratio cap was abolished and investment banks thus obtained a larger responsibility in setting IPO offer prices. We further control for a number of IPO-related factors, by means of *Fee rate* and *Abnormal return*. If, as suggested by Loughran and Ritter (2004), issuers attach great importance to research coverage and are willing to pay a higher fee rate for it to their investment bank as well as to accept a larger first-day abnormal

[50] In our sample, all firms that are followed by their lead manager's financial analysts are also covered by at least one non-affiliated financial analyst. So, we can exclude the possibility that the firm is covered only by its lead manager's analyst(s).

[51] We separately use the Shanghai and Shenzhen market P/E ratio for the firms listed in the corresponding market. The market P/E ratios are obtained from the websites of the Shanghai and Shenzhen stock markets.

return, the odds of underwriter-analyst follow-up may increase with those two factors. Next, we include the *SEO dummy* as an explanatory variable, as underwriters may be more willing to cover IPO firms with plans to raise seasoned equity. As in the main regression, we also control for firm-specific characteristics by means of *Assets* and the *SOE dummy*. Bigger firms likely provide more opportunities for future investment-banking business and, thus, may find it easier to attract research coverage by their underwriter's financial analyst(s). Investment banks may also be more willing to cover SOEs, as the Chinese state is a repetitive participant in the IPO market. We again include industry and year fixed effects by means of *Industry dummies* and *Year dummies*. Our first-step regression model thus looks as follows:

$$Follow-up\_dummy = C + \beta_1 Underwriter\_analyst\_Number + \beta_2 \Pr icing\_aggressiveness + \beta_3 Fee\_rate + \beta_4 Abnormal\_return$$
$$+\beta_5 SEO\_dummy + \beta_6 Assets + \beta_7 SOE\_dummy + \sum_{i=1}^{12} \theta_i Industry\_dummies_i + \sum_{i=1}^{n} \gamma_i Year\_dummies + \varepsilon$$

From the above regression, we calculate Heckman's (1976) *inverse Mills ratio* and add it as an extra control variable in the second-step regression, relying only on the EPS forecasts for the firms that are followed by at least one of their lead manager's financial analysts.

3.4.2. Empirical results

Table 3.5 shows the results from the forecast-error (*FE*) regressions, while Table 3.6 displays the results from the forecast-accuracy (*FA*) regressions. In Panel A, the results relate to the period before June 10, 2009; Panel B then shows the results for the period after June 10, 2009. In each subperiod, we use all forecasts issued in the first year after the IPO. In addition, we run the regressions using all forecasts released in the 90-day lock-up period. For each regression, the first column shows the results using simple OLS, while the subsequent two columns show the Heckman (1976) two-step results.

Table 3.5
The forecast error regression

In this table, we report the regression results on forecast error (FE) using a simple OLS regression and using Heckman's (1976) two-step regression model. In Panel A, we show the regression results for the period before June 10, 2009; Panel B then reports the regression results for the period after June 10, 2009. In both panels, we present the regression results using all forecasts issued in the 90 days after IPO (90 days) and using all forecasts issued in the first year after IPO (*One year*). For each regression, the first column shows the results using simple OLS (OLS), the subsequent two columns shows the Heckman (1976) two-step results (Heckman). The test and control variables have been defined in Table 3.3. The regression models also include *Industry dummies* according to the CSRC 13 industry classification and *Year dummies*. For the first-step Heckman regressions, we run a probit regression model on whether the IPO firm is followed by at least one analyst affiliated with the IPO lead manager. The explanatory variables in this regression model include the following: the number of analysts employed by the IPO underwriter at the beginning of the IPO year (*Underwriter analyst number*); the issuing P/E ratio minus the market P/E ratio (*Pricing aggressiveness*); *Fee rate*, *Abnormal return*, *SEO dummy*, *Assets*, and *SOE dummy*. We also include *Industry dummies* and *Year dummies*. We calculate the inverse Mills ratio based upon this probit regression and include it in the second-step regression. The variables in the second-step regressions are the same as those in the OLS model. We always cluster the errors by financial analysts. The coefficients significant at the 1%, 5% and 10% level are indicated with ***, **, *, respectively.

Panel A: 2004–June 9, 2009

	One year			90 days		
	OLS	Heckman		OLS	Heckman	
		First step	Second step		First step	Second step
Intercept	5.7848***	-5.3017***	7.5885***	1.8927	-7.2600***	1.2600
	(0.00)	(0.00)	(0.00)	(0.50)	(0.00)	(0.62)
Underwriter analyst number		0.0210***			0.0296***	
		(0.00)			(0.00)	
Pricing aggressiveness		0.0130***			0.0130**	
		(0.00)			(0.04)	
Affiliated dummy	0.2928		0.2040	-0.2002		-0.4191
	(0.19)		(0.15)	(0.37)		(0.33)
Affiliated dummy * Relative price	-0.1248		-0.1278	0.1503		0.1702
	(0.37)		(0.20)	(0.65)		(0.59)
Relative price	0.1801		0.1721	0.1571		0.1039
	(0.15)		(0.16)	(0.40)		(0.61)
Analyst ranking	-0.2524		-0.2512	-0.2174		-0.1791
	(0.24)		(0.24)	(0.31)		(0.49)
Analyst experience	0.0546		0.0604	0.0074		-0.0128
	(0.25)		(0.15)	(0.91)		(0.84)
Market share	-2.5542***		-2.7718***	-2.5331**		-2.2160**
	(0.00)		(0.00)	(0.04)		(0.01)
Number of analysts	0.0014		0.0015	-0.0036		-0.0062
	(0.68)		(0.50)	(0.15)		(0.47)
Fee rate	-4.4755	12.6818***	-8.7861	14.9531	6.0118**	9.0780
	(0.55)	(0.00)	(0.40)	(0.40)	(0.03)	(0.54)
Abnormal return	-0.0182	0.1863***	0.0344	-0.2684	0.0169	-0.3012
	(0.89)	(0.00)	(0.68)	(0.40)	(0.92)	(0.15)
SEO dummy	0.9721***	0.3756***	0.9904***	0.5686**	0.4864***	0.7697***
	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)
Assets	-0.1888***	0.3256***	-0.2551***	0.0479	0.4403***	0.0109
	(0.00)	(0.00)	(0.00)	(0.64)	(0.00)	(0.91)
SOE dummy	-1.6932***	0.2099***	-1.682***	-2.0838***	0.8221***	-1.6842***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Forecast horizon	0.0012***		0.0012***	0.0012***		0.0013***
	(0.00)		(0.00)	(0.00)		(0.00)
Inverse Mills ratio			0.3782			0.5576*
			(0.20)			(0.06)
Industry dummies		Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes
p-value of *F*-test/ Chi2 test	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R-square	0.32	0.44		0.37	0.53	
Number of observations	3,098	5,647	3,098	576	1,097	576

Panel B: June10, 2009–2012

	One year			90 days		
	OLS	Heckman		OLS	Heckman	
		First step	Second step		First step	Second step
Intercept	1.2973*	-8.2861***	1.8490***	-3.1269**	-9.5669***	-2.5359**
	(0.07)	(0.00)	(0.00)	(0.05)	(0.00)	(0.03)
Underwriter analyst number		0.0234***			0.0269***	
		(0.00)			(0.00)	
Pricing aggressiveness		0.0109***			0.0060***	
		(0.00)			(0.00)	
Affiliated dummy	0.3298**		0.3441***	0.6308***		0.6805***
	(0.03)		(0.00)	(0.01)		(0.00)
Affiliated dummy * Relative price	0.0662		0.0389	-0.9300**		-1.0573***
	(0.78)		(0.68)	(0.03)		(0.00)
Relative price	0.3093		0.3003	0.3885		0.3990
	(0.21)		(0.20)	(0.14)		(0.21)
Analyst ranking	-0.0835		-0.0749*	-0.0386		-0.0068
	(0.39)		(0.09)	(0.81)		(0.95)
Analyst experience	0.0460		0.0501	0.1206		0.1242
	(0.75)		(0.70)	(0.15)		(0.20)
Market share	-2.2347***		-2.1411***	-2.1985**		-1.1951
	(0.00)		(0.00)	(0.04)		(0.13)
Number of analysts	-0.0015		-0.0015*	-0.0015		-0.0011
	(0.31)		(0.06)	(0.57)		(0.51)
Fee rate	1.7307*	2.0802***	0.5090	5.3303**	3.8829***	5.0335**
	(0.07)	(0.00)	(0.62)	(0.05)	(0.01)	(0.03)
Abnormal return	-0.2259	0.2237***	-0.2042	-0.2010	0.3255***	-0.1820
	(0.17)	(0.00)	(0.20)	(0.36)	(0.00)	(0.27)
SEO dummy	0.4955***	0.0009	0.4510***	0.5338***	0.2446***	0.4182***
	(0.00)	(0.99)	(0.00)	(0.00)	(0.00)	(0.00)
Assets	-0.0994***	0.2856***	-0.1260***	0.0403	0.3300***	-0.0093
	(0.00)	(0.00)	(0.00)	(0.53)	(0.00)	(0.82)
SOE dummy	-0.0250	0.1240***	-0.0818	-0.2178*	0.2640***	-0.0851
	(0.83)	(0.00)	(0.26)	(0.07)	(0.00)	(0.21)
Forecast horizon	0.0039***		0.0039***	0.0042***		0.0042***
	(0.00)		(0.00)	(0.00)		(0.00)
Inverse Mills ratio			0.1112*			0.1910**
			(0.07)			(0.04)
Industry dummies		Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes
p-value of *F*-test/ Chi2 test	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R-square	0.32	0.22		0.37	0.23	
Number of observations	12,838	20,369	12,838	2,716	4,381	2,716

Table 3.6
The forecast accuracy regressions

In this table, we report the regression results on forecast accuracy (FA) using a simple OLS regression and using Heckman's (1976) two-step regression model. In Panel A, we show the regression results for the period before June 10, 2009; Panel B then reports the regression results for the period after June 10, 2009. In both panels, we present the regression results using all forecasts issued in the 90 days after IPO (90 days) and using all forecasts issued in the first year after IPO (*One year*). For each regression, the first column shows the results using simple OLS (OLS), the subsequent two columns shows the Heckman (1976) two-step results (Heckman). The test and control variables have been defined in Table 3.3. The regression models also include *Industry dummies* according to the CSRC 13 industry classification and *Year dummies*. For the first-step Heckman regressions, we run a probit regression model on whether the IPO firm is followed by at least one analyst affiliated with the IPO lead manager. The explanatory variables in this regression model include the following: the number of analysts employed by the IPO underwriter at the beginning of the IPO year (*Underwriter analyst number*); the issuing P/E ratio minus the market P/E ratio (*Pricing aggressiveness*); *Fee rate*, *Abnormal return*, *SEO dummy*, *Assets*, and *SOE dummy*. We also include *Industry dummies* and *Year dummies*. We calculate the inverse Mills ratio based upon this probit regression and include it in the second-step regression. The variables in the second-step regressions are the same as those in the OLS model. We always cluster the errors by financial analysts. The coefficients significant at the 1%, 5% and 10% level are indicated with ***, **, *, respectively.

Panel A: 2004–June 9, 2009

	One year			90 days		
	OLS	Heckman		OLS	Heckman	
		First step	Second step		First step	Second step
Intercept	6.7850***	-5.3017***	7.8404***	2.1209	-7.2600***	1.2932
	(0.00)	(0.00)	(0.00)	(0.35)	(0.00)	(0.43)
Underwriter analyst number		0.0210***			0.0296***	
		(0.00)			(0.00)	
Pricing aggressiveness		0.0130***			0.0130**	
		(0.00)			(0.04)	
Affiliated dummy	0.2950		0.2121	-0.2312		-0.4390
	(0.20)		(0.15)	(0.30)		(0.28)
Affiliated dummy * Relative price	-0.1278		-0.1330	0.1212		0.1895
	(0.35)		(0.21)	(0.61)		(0.61)
Relative price	0.1902		0.1870	0.1871		0.1200
	(0.17)		(0.17)	(0.39)		(0.76)
Analyst ranking	-0.6734**		-0.7196**	-0.2520		-0.1681
	(0.02)		(0.02)	(0.29)		(0.78)
Analyst experience	0.0501		0.0721	0.0090		-0.0209
	(0.28)		(0.15)	(0.80)		(0.55)
Market share	-2.7621***		-2.9300***	-2.721**		-2.5320**
	(0.00)		(0.00)	(0.05)		(0.01)
Number of analysts	0.0010		0.0012	-0.0021		-0.0039
	(0.81)		(0.31)	(0.27)		(0.40)
Fee rate	-4.4012	12.6818***	-8.531	14.9651	6.0118**	9.3760
	(0.50)	(0.00)	(0.37)	(0.29)	(0.03)	(0.32)
Abnormal return	-0.0170	0.1863***	-0.0314	-0.2610	0.0169	-0.2917
	(0.79)	(0.00)	(0.68)	(0.36)	(0.92)	(0.19)
SEO dummy	0.9621***	0.3756***	0.9721***	0.5486**	0.4864***	0.7370***
	(0.00)	(0.00)	(0.00)	(0.05)	(0.00)	(0.00)
Assets	-0.1932***	0.3256***	-0.2735***	0.0370	0.4403***	0.0123
	(0.00)	(0.00)	(0.00)	(0.78)	(0.00)	(0.71)
SOE dummy	-1.7135***	0.2099***	-1.7026***	-2.1390***	0.8221***	-1.6511***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Forecast horizon	0.0011***		0.0011***	0.0012***		0.0013***
	(0.00)		(0.00)	(0.00)		(0.00)
Inverse Mills ratio			0.3610			0.5620*
			(0.20)			(0.06)
Industry dummies		Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes
p-value of *F*-test/ Chi2 test	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R-square	0.32	0.44		0.37	0.53	
Number of observations	3,098	5,647	3,098	576	1,097	576

Panel B: June10, 2009–2012

	One year			90 days		
	OLS	Heckman		OLS	Heckman	
		First step	Second step		First step	Second step
Intercept	1.3210*	-8.2861***	1.970***	-3.1001**	-9.5669***	-2.2515**
	(0.06)	(0.00)	(0.00)	(0.05)	(0.00)	(0.04)
Underwriter analyst number		0.0234***			0.0269***	
		(0.00)			(0.00)	
Pricing aggressiveness		0.0109***			0.0060***	
		(0.00)			(0.00)	
Affiliated dummy	0.3521**		0.3761***	0.6710***		0.6991***
	(0.03)		(0.00)	(0.01)		(0.00)
Affiliated dummy * Relative price	0.0632		0.0360	-0.9090**		-0.9760***
	(0.80)		(0.79)	(0.04)		(0.00)
Relative price	0.3130		0.3214	0.4108		0.4210
	(0.21)		(0.25)	(0.17)		(0.19)
Analyst ranking	-0.2981*		-0.3210*	-0.0371		-0.0059
	(0.08)		(0.06)	(0.81)		(0.97)
Analyst experience	0.0470		0.0520	0.1310		0.1300
	(0.75)		(0.65)	(0.17)		(0.20)
Market share	-2.3210***		-2.2120***	-2.3009**		-1.301*
	(0.00)		(0.00)	(0.04)		(0.10)
Number of analysts	-0.0012		-0.0013*	-0.0012		-0.0014
	(0.29)		(0.07)	(0.60)		(0.31)
Fee rate	1.9607*	2.0802***	0.5085	5.6908**	3.8829***	5.129**
	(0.06)	(0.00)	(0.62)	(0.05)	(0.01)	(0.03)
Abnormal return	-0.2241	0.2237***	-0.1760	-0.1951	0.3255***	-0.1654
	(0.17)	(0.00)	(0.25)	(0.38)	(0.00)	(0.29)
SEO dummy	0.4890***	0.0009	0.4328***	0.5176***	0.2446***	0.3980***
	(0.00)	(0.99)	(0.00)	(0.00)	(0.00)	(0.00)
Assets	-0.0965***	0.2856***	-0.1109**	0.0352	0.3300***	-0.0087
	(0.00)	(0.00)	(0.02)	(0.60)	(0.00)	(0.83)
SOE dummy	-0.0231	0.1240***	-0.0790*	-0.2153*	0.2640***	-0.0838
	(0.89)	(0.00)	(0.09)	(0.07)	(0.00)	(0.28)
Forecast horizon	0.0038***		0.0038***	0.0042***		0.0042***
	(0.00)		(0.00)	(0.00)		(0.00)
Inverse Mills ratio			0.1087*			0.2076**
			(0.08)			(0.05)
Industry dummies		Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes
p-value of *F*-test/ Chi2 test	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R-square	0.32	0.22		0.37	0.23	
Number of observations	12,838	20,369	12,838	2,716	4,381	2,716

As to the forecast-error (*FE*) regression, the coefficient on *Affiliated dummy* is never significant before June 10, 2009. So, we find no evidence whatsoever that affiliated financial analysts issue more positively biased EPS forecasts than non-affiliated ones in the first subperiod. Likewise, the interaction term between *Affiliated dummy* and *Relative price* is never significant either in this time frame. After June 10, 2009, regardless of the time interval in which the EPS forecast was released (one year or 90 days), the earnings forecasts released by affiliated financial analysts are significantly larger than those of non-affiliated analysts. For forecasts issued in the first post-IPO year, the forecast error made by affiliated financial analysts is on average 33

percentage points bigger than that of non-affiliated analysts (35 percentage points in the Heckman regression). For forecasts issued in the first 90 days after IPO, this difference even increases to a stunning 63 percentage points (68 percentage points in the Heckman regression). The latter outcome thus reveals that affiliated financial analysts release even more positively biased forecasts during the 90-day lock-up period, which is when post-IPO price support likely is needed most.[52]

Next, while we find no evidence that the positive bias of affiliated financial analysts grows larger as the post-IPO stock price declines in the first post-IPO year, we do detect that the coefficient on the interaction term between *Affiliated dummy* and *Relative price* becomes negative and significant at the 5% level (1% level in the Heckman regression) after June 10, 2009. In other words, when the aftermarket stock price declines by one percentage point relative to the IPO offer price in the 90-day lock-up period, the forecast errors made by affiliated financial analysts are on average 0.93 percentage points *more* positive than the forecast errors of non-affiliated analysts (1.06 percentage points in the Heckman regression). The coefficient on *Relative price* itself is never significant, thereby indicating that non-affiliated financial analysts do not positively distort their EPS forecasts depending upon how the issuer's stock price in the aftermarket relates to the IPO offer price.

The results from the forecast-accuracy (*FA*) regression are very similar to those from the forecast-error (*FE*) regression. Before June 10, 2009, we do not find a significant negative coefficient on *Affiliated dummy*. Thus, the presumed information advantage that affiliated financial analysts enjoy because of IPO underwriting does not result in more accurate EPS forecasts. In contrast, in the period after June 10, 2009, affiliated financial analysts make significantly *bigger* absolute forecast errors than non-affiliated analysts do. This accuracy gap between affiliated and

[52] As a robustness check on this 90-day window, we also used the forecasts released in the 30 days and 120 days after IPO for the firms becoming listed after June 10, 2009. The coefficient on *Affiliated dummy* equals 0.32 for the 30-day regression (significant at the 5% level) and 0.45 for the 120-day regression (significant at the 1% level). Together, those results reveal that affiliated financial analysts provide post-IPO price support especially in the 90-day window after listing.

non-affiliated financial analysts is most pronounced in the 90-day lock-up period and grows even larger as the issuer's stock price in the aftermarket drops relative to the IPO offer price.

Overall, the results show that when a post-IPO price-supporting incentive did not exist (i.e. before June 10, 2009), affiliated financial analysts did not release more positively biased EPS forecasts than non-affiliated ones. But once the post-IPO price-supporting incentive emerges (i.e. after June 10, 2009), affiliated financial analysts tend to issue more positively biased EPS forecasts than non-affiliated ones. Moreover, when this post-IPO price-supporting incentive is especially strong (i.e. in the 90-day lock-up period and when the aftermarket stock price dropped), this relative bias becomes even stronger. Thus, the results of the Chinese natural experiment allow us to conclude that the *relative bias* of affiliated financial analysts is positively affected by their incentives to provide post-IPO price support. Moreover, the results clearly refute the 'analyst-optimism view', which predicts that the relative bias should neither change with the regulatory reform nor depend on the aftermarket stock price (*Hypotheses 1A* and *1B*). The results also indicate that the 'information-advantage view' may not apply in Chinese domestic stock markets. According to the 'information-advantage view', when affiliated as well as non-affiliated financial analysts issue a positively distorted forecast, a *less biased forecast* means that the expected forecast error of affiliated analysts is *less positive* than the expected forecast error of non-affiliated analysts. Likewise, when affiliated as well as non-affiliated financial analysts issue a negatively distorted forecast, a *less biased forecast* means that the expected forecast error of affiliated analysts is *less negative* than that of non-affiliated analysts. So, under the 'information-advantage view', the expected sign of the coefficient on *Affiliated dummy* depends upon whether the analysts – affiliated as well as non-affiliated – issue positively or negatively distorted forecasts. In our sample, both affiliated and non-affiliated analysts release positively biased forecasts in both subperiods (Table 3.1). Building on the 'information-advantage view', the sign of the parameter estimate for *Affiliated dummy* should be negative in both subperiods. However, we find an insignificant coefficient in the first subperiod and a significant but positive coefficient in the second superiod.

From these results, we thus can refute *Hypothesis 2A*. Overall, using Chinese data, we find compelling evidence that the relative bias shown by affiliated financial analysts is due to an *intentional* distortion rather than to *unintentional* optimism.

Next, we briefly discuss the results as to the control variables in the forecast-error (*FE*) regressions. Star analysts do not seem to issue less biased forecasts than non-star analysts do before June 10, 2009. However, after June 10, 2009, we find some evidence that star analysts' forecasts are less biased, but only for EPS forecasts issued in the first listing year (and when using the Heckman model). As the ranking of financial analysts was not yet very stable over our sample period, this result may not be so surprising after all. The analyst's experience (*Analyst experience*) cannot help to reduce forecast errors either. Yet, the average financial analyst in our sample only had a 3.3 years track record (median of 3) by the end of 2012. Such a short track record may not have been enough yet to establish a credible reputation. Next, we do observe that investment banks with a higher market share in IPO underwriting (*Market share*) are associated with less positively biased EPS forecasts. We conjecture that in order to compete against bigger IPO underwriters, investment banks with a smaller market share could incite their financial analysts to release more favorable forecasts. We also find some evidence that the investment banks employing a larger number of financial analysts issue less biased forecasts, yet this effect is not consistently significant. Combining our findings on analyst-specific characteristics (*Analyst ranking, Analyst experience*) and bank-specific characteristics (*Market share, Number of analysts*), we conclude that the behavior of financial analysts in Chinese domestic stock markets is determined mostly by their employers rather than by the analysts themselves, i.e. the boss talks.

We further find that the issuers that paid a higher IPO fee rate to their investment bank(s) are rewarded by more positively biased EPS forecasts, but only in the second subperiod. We find no significant influence of the first-day abnormal return on the forecast error. Nonetheless, financial analysts release more positively biased EPS forecasts for the firms that subsequently initiate a seasoned equity offering (SEO). This finding is in line with the idea that investment banks may

rely upon their analysts' EPS forecasts to compete for future underwriting business in subsequent SEOs. Next, bigger issuers (*Assets*) are associated with less positively biased EPS forecasts, in line with the idea that those firms have more stable earnings and release more information to the public. Correspondingly, it may be more difficult for financial analysts to distort their earnings forecasts on these firms. However, the coefficient on *Assets* is not significant during the 90-day lock-up period.[53] State-owned enterprises (SOEs) receive significantly less positively biased forecasts than private-controlled firms do in the first subperiod, but this effect seems to have declined over time. Compared to private-controlled firms, SOEs have more stable earnings and usually enjoy some monopoly power in their industry. The earnings of SOEs are thus easier to predict and, hence, little room is left to further distort the earnings forecasts for SOEs. It is also possible that private owners care more about their firm's stock price in the aftermarket, thereby inciting financial analysts to issue more positively biased forecasts. Finally, like Lin and McNichols (1998) and Bessler and Stanzel (2009), we find that the *Forecast horizon* significantly positively influences the forecast error in both subperiods. Indeed, the longer the time interval between the release of the forecast and the end of the fiscal year to which the EPS forecast relates, the easier it is for financial analysts to manipulate their EPS forecasts without causing suspicion among investors.

Overall, the results on the control variables in the forecast-accuracy (*FA*) regression are largely comparable to those in the forecast-error (*FE*) regression, so we do not discuss them in detail. The only difference that we find is that *Analyst ranking* significantly improves forecast accuracy in the *FA* regression. So, although star analysts in general have a forecast error that is as big as that of non-star analysts, they do release more accurate forecasts.

The inverse Mills ratio, resulting from the first-step regression of the Heckman model, is always significant, except in the one-year *FE* and *FA* regression in the time frame before June 10, 2009. This outcome thus indicates that the choice of the IPO lead manager's analyst(s) to cover the issuing firm generally correlates with the forecast error and forecast accuracy. More importantly,

[53] When using the log of the firm's market capitalization before IPO as a robustness check, we find that the coefficient on firm size remains non-significant (*p*-value=0.578).

the results from the second-step Heckman regression model are very similar to those from the OLS regression model. We thus can conclude that our results and inferences are not uniquely determined by the follow-up decision of the IPO underwriter's financial analysts.

As a further direct test of *Hypothesis 3B*, we divide the EPS forecasts in each subperiod into forecasts on the EPS of the same fiscal year as the forecast is released (*same-year EPS*), and forecasts on the EPS of the fiscal year after the year that the forecast is released (*next-year EPS*).[54] We focus on the forecasts released in the 90-day lock-up period, when post-IPO price-supporting incentives are strongest. We run a Heckman (1976) two-step regression model for this purpose. Table 3.7 shows the results. To simplify the output, we do not include the first-step regression results in this table; they are similar to those in Table 3.5. We neither show the regression results as to forecast accuracy, as they are again similar to those from the *FE* regressions.

The results confirm our conjectures. Before June 10, 2009, when post-IPO price-supporting incentives were absent, we cannot find any significant difference in the EPS forecasts of affiliated and non-affiliated financial analysts, no matter whether their EPS forecasts relate to the same year as the forecasting year or a subsequent year. After June 10, 2009, both same-year EPS forecasts and future-year EPS forecasts released by affiliated financial analysts are significantly more positive than those of non-affiliated analysts, yet the magnitude of the effect is largely different. The next-year EPS forecasts of affiliated financial analysts are on average 106 percentage points bigger than those of non-affiliated analysts; as regards the same-year EPS forecasts, the difference equals only 19 percentage points, but is significant. Moreover, the significant negative coefficient on the interaction term between *Affiliated dummy* and *Relative price* in the next-year EPS regressions after June 10, 2009 reveals that affiliated financial analysts strongly distort their EPS forecasts for future years when the aftermarket stock price declines. The effect for EPS in the same accounting year is also significant, but the effect is generally smaller. Our results thus confirm

[54] We also checked the EPS forecasts for the fiscal years after the first post-IPO year; we find that results are similar. For the EPS forecasts relating to the fiscal years after the first post-IPO year, affiliated analysts are on average 124 percentage points more positively biased than non-affiliated analysts (*p*-value=0.01).

Hypothesis 3B, revealing that affiliated financial analysts mainly distort their future-year EPS forecasts when post-IPO price support is needed most.

Table 3.7
The forecast error regressions using the forecasts for different fiscal years

In this table, we report the regression results on forecast error (FE) using Heckman's (1976) two-step regression model. All EPS forecasts are released in the 90 days after IPO. We divide the full sample into 2004–June 9, 2009 and June 10, 2009–2012. For each subperiod, we further divide the sample into the forecasts relating to the EPS of the same fiscal year as the forecast is made (Same Year) and the forecasts on the EPS of the fiscal year after the forecast is made (Next Year). The test and control variables have been defined in Table 3.3. The regression models also include *Industry dummies* according to the CSRC 13 industry classification and *Year dummies*. We calculate the inverse Mills ratio from the prediction of the first-step regression and put the ratio into the second-step regression. We always cluster errors by financial analysts. The coefficients significant at the 1%, 5% and 10% level are indicated with ***, **, *, respectively.

	2004–June 9, 2009		June 10, 2009–2012	
	Same Year	Next Year	Same Year	Next Year
Intercept	1.2971	6.5100*	-0.5328	-2.3752
	(0.68)	(0.06)	(0.31)	(0.23)
Affiliated dummy	0.1238	-0.8457	0.1864***	1.0582***
	(0.82)	(0.16)	(0.00)	(0.00)
Affiliated dummy * Relative price	0.0076	0.4738	-0.3044**	-1.6137***
	(0.99)	(0.34)	(0.04)	(0.00)
Relative price	0.3011	-0.1673	0.1885**	0.065
	(0.26)	(0.54)	(0.01)	(0.01)
Analyst ranking	-0.1590	-0.1961	0.0072	0.0291
	(0.64)	(0.59)	(0.87)	(0.86)
Analyst experience	-0.0192	0.0033	0.0110	0.206***
	(0.83)	(0.97)	(0.45)	(0.00)
Market share	-5.0791***	-1.3480**	-0.8995**	-1.9532**
	(0.00)	(0.03)	(0.02)	(0.05)
Number of analysts	-0.0020	-0.0044	-0.0008	-0.0012
	(0.75)	(0.51)	(0.31)	(0.68)
Fee rate	15.8215	-9.8191	5.0216***	5.4487**
	(0.45)	(0.63)	(0.00)	(0.02)
Abnormal return	0.0315	-0.0774	-0.1977	-0.3391
	(0.92)	(0.15)	(0.21)	(0.24)
SEO dummy	0.7524**	1.0748***	0.0524	0.7441***
	(0.02)	(0.00)	(0.36)	(0.00)
Assets	-0.0720	-0.3760**	0.0070	-0.0404
	(0.56)	(0.05)	(0.71)	(0.57)
SOE dummy	-0.4451	-1.7806***	-0.0068	-0.1327*
	(0.44)	(0.00)	(0.90)	(0.07)
Forecast horizon	0.0033**	0.0020***	0.0031***	0.0037***
	(0.01)	(0.00)	(0.00)	(0.00)
Inverse Mills ratio	1.2421**	1.2092***	0.0307	0.2689**
	(0.03)	(0.01)	(0.69)	(0.07)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
p-value of Chi2-test	0.00	0.00	0.00	0.00
N	169	128	1,050	871

3.5. Conclusions

The current literature agrees that financial analysts typically have an incentive to distort their earnings forecasts to help their employers – the investment banks – to attract future corporate finance business, to generate trading business, and to maintain a good relationship with firm management. However, this literature is still rather vague as to *how* and *why* affiliated financial analysts may distort their earnings forecasts *even more* than non-affiliated analysts do. In this paper, we address this research question by examining how the IPO underwriting relationship influences the opinion of affiliated financial analysts. By doing so, we echo the call by Ramnath *et al.* (2008) that "*Further research is needed to sort out the effects of affiliation and investment banking on analysts' optimism/pessimism*."

We put forward and tested three possible explanations, thereby finding support for the view that affiliated financial analysts may strategically distort their earnings forecasts upwards to offer post-IPO price support for the issuer's stock in the aftermarket. On the other hand, we find no evidence that analyst optimism or the information advantage presumably enjoyed by analysts affiliated with the IPO lead manager influence those analysts' EPS forecasts. We use Chinese data, as they offer a natural experiment with/without post-IPO price-supporting incentives. To the best of our knowledge, such a natural-experiment opportunity is non-existent in any other major IPO market, where underwriters always take full responsibility as to the IPO offer price. We divided the entire sample period into two subperiods, from Jan. 1, 2004 to June 9, 2009 and from June 10, 2009 to Dec. 31, 2012. Before the regulatory reform, we find that affiliated financial analysts exhibit no difference in their forecast error or forecast accuracy when compared to non-affiliated financial analysts. However, after June 10, 2009, affiliated financial analysts issue significantly more positively biased EPS forecasts than non-affiliated analysts do (*relative bias*); their forecast accuracy is also significantly lower than that of non-affiliated analysts. During the 90-day lock-up period, when post-IPO price support is needed most, this relative bias is even bigger, while their relative accuracy is worse. We also find that when using EPS forecasts to provide post-IPO price

support, analysts tend to distort especially the EPS forecasts of fiscal years further away from the forecast release date. Such findings reveal that affiliated analysts try to strategically mask their post-IPO price-supporting activities. All this evidence shows that the relative forecast error among affiliated analysts results from post-IPO price-supporting incentives rather than from analysts' genuine optimism. We do not find any evidence that the information advantage helped affiliated analysts to produce more accurate or less biased forecasts. Our research contributes to the financial analysts' literature by presenting and verifying a unique self-serving incentive that affiliated analysts have when releasing their opinion, that is to offer post-IPO price support. We also contribute to the IPO literature by exploring a possible way for underwriters to offer price support.

The results from our research have several policy implications. First, like in the U.S.A., before the Global Settlement was reached in April 2003, the impact of self-serving behavior on the earnings forecasts issued by affiliated financial analysts in China is substantial. The pressure to offer post-IPO price support severely distorted the earnings forecasts issued by affiliated financial analysts. The Chinese regulator should follow the example of the SEC to further investigate such behavior and to enforce a clear separation between the corporate finance department and the research department of investment banks. Second, we notice that by the end of 2012, independent research institutions are still rather scarce in China. In the absence of any pressure to generate/safeguard other business activities, financial analysts employed by independent research institutions may provide more objective forecasts. So, we recommend the regulator to also design policies favoring the development of such independent research. Third, we suggest further research on the compensation scheme of financial analysts employed by investment banks. As we find in our article, analysts' behavior seems largely determined by their employers. It is therefore interesting to check whether the compensation scheme used by investment banks induces wrong incentives on the part of their analysts. Fourth, as affiliated financial analysts tend to use especially long-term EPS forecasts to provide post-IPO price support, we suggest investors to be particularly cautious when relying on the latter forecasts.

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General Conclusions and discussion

Overall, this dissertation does not paint a positive picture about the role of investment banks in Chinese IPOs from 1995 to 2011. We find that before 2005, investment banks gain their market share *only* by political connection. After that (from 2005 to 2010), with the gradual abolishment of government direct intervention into IPO underwriting market, the influence of political connection reduced, investment banks have been able to gain market share by charging low underwriting fees. However, due to the issuing price intervention (P/E cap), investment banks never gain market share by offering better certification on issuing firms. On the contrary, they have to compete by complying with the earnings exaggeration of issuers. Moreover, properly pricing IPOs never played a role in determining market share of investment banks.

From 2010 to 2011, in the two years after the total abolishment of issuing price intervention, we find that investment banks help issuers to exploit overoptimistic investors by raising huge amount of capital exceeding that is needed (over-issuance). For the 587 IPO firms listed in 2010 and 2011, the average over-issuance equals 2.55 (median of 2.36). In total, RMB 299 billion of capital was raised without corresponding investment projects. We also find that the compensation of investment banks—underwriting fee rates, increases with over-issuance. We estimate that issuers paid an *additional* RMB 4.37 billion in fees to investment banks as a result of over-issuance. This translates into an extra fee of RMB 7.44 million for an average IPO. Our results indicate that investment banks have gain huge benefit in these two years by helping issuers to exploit primary market investors.

Coherent with what we find in over-issuance, we observe that ever since the abolishment of P/E cap, the financial analysts hired by IPO underwriters (affiliated analysts) offer significantly more optimistic earnings forecasts on IPO firms than do the analysts hired by non-underwriters. The earnings forecasts released by affiliated financial analysts are on average 33 percentage points more positively biased than those of non-affiliated analysts. Moreover, in the 90 days after first

listing, this relative bias even increases to 63 percentage points and enlarges further when the issuer's stock price dropped after the IPO. On the contrary, we do not find any significant difference in the earnings forecast between affiliated and non-affiliated analysts before the regulatory change. These findings lead us to conclude that ever since the regulatory change, investment banks use the earnings forecasts to offer post-IPO price support to the firms that they underwrote.

These observations are presented separately in the three chapters, but when looking at them as a whole piece, I obtain some further thoughts about free markets mechanism and about regulatory intervention. Those thoughts are definitely not the conclusions of this dissertation; rather, they are interesting for future researches.

First, we notice that those bad behaviours of investment banks in IPO markets are not unique in China. Many literatures studying the Western market make similar findings. However, an interesting difference from the Western market is that seems in China, the bad behaviour of investment banks are all helping issuers to exploit investors. While in the Western market, investment banks may help investors to exploit issuers. For example, Loughren and Ritter (2004) suggest that in the US market, underwriters may intentionally price the IPO shares too low and allocate those cheap initial shares to their close clients. We also notice that in China, retail investors dominate the market. A report by the International Organization of Securities Commissions (IOSC) shows that retail investors held 83% of market capitalization and were responsible for 86% of trading volume in 2010. While in the US, institutional investors dominate the market by obtaining over 90% of initial shares and by generating 98% of trading volume. In other words, in Chinese IPO market, the buyers (investors) are much weaker than the sellers (issuers) in terms of their bargaining power, their capacity to collect/analysis information, to make rational judgements, to obtain legal protection and to exercise political influence. While in the US market it is obviously the opposite. Our research, when comparing with the research in the US market, thus show an interesting but often neglected aspect in intermediary's behaviour: the intermediaries, when

maximizing their own benefits by serving sellers and buyers in a market, may intentionally help one party to exploit the other party. Which party the intermediary helps/exploits depends on the relative strength [55] of the two parties. When buyers are stronger (as in the case in the US IPO market), the intermediary may help buyers to exploit sellers; when sellers are stronger (as in the case of Chinese IPO market), the intermediary helps sellers to exploit buyers. In the markets where exists severe power asymmetry between sellers and buyers, free market mechanism may not lead to Pareto improvement even with the existence of intermediary between seller and buyers. Such markets exist everywhere. For example, in labour market, recruiters are often in a much stronger position than the job-seekers are. In these markets, regulatory protection on the weaker party becomes indispensible.

My second thought is: markets are connected, when making regulatory interventions in one market, the regulator must be very much alert of how these interventions affect other closely linked markets. In our research, there exits two closely connected markets: the IPO market, where issuers (sellers) sell their initial shares to investors (buyers); the IPO underwriting market, where investment banks (sellers) sell their IPO underwriting service to issuers (buyers). After 2005, the Chinese regulator largely loosed its intervention in the IPO underwriting market, so as to allow the 'invisible hand' to regulate the behaviour of the investment banks. But we show that investment banks failed to properly behave under the 'invisible hand'. The reason is: the regulator still keeps its intervention in a closely linked market, i.e. the IPO market, by determining issue price. As a result of this issue-price intervention in IPO market, in IPO underwriting market, investors have no intention to seek certification from investment banks and issuers do not value the pricing skills of investment banks. Consequently, the free market mechanism in IPO underwriting market failed to offer proper incentive to investment banks and thus became ineffective. This is a typical example showing that the regulatory intervention in one market may distort the behaviour of the agents in

[55] By 'strength' I mean the bargaining power against the intermediary, the capacity to collect and analyze information, the capacity to obtain legal protection and to exercise political influence.

other closely linked markets. Regulators must be aware of those effects when making market intervention.

Overall, what I have learnt from this research is that free market has its limits; regulatory intervention also has its limits. To achieve efficient resource allocation and to maximize social welfare, a good combination of free market and regulatory intervention is indispensible.

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